

JOURNAL *of the* **American Veterinary Medical Association**

Formerly AMERICAN VETERINARY REVIEW

(Original Official Organ U. S. Vet. Med. Assn.)

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Vol. LXXXIX, N. S. Vol. 42

NOVEMBER, 1936

No. 5

VETERINARY STUDENT ENROLLMENT FOR 1936-1937

For the twelfth successive year, the enrollment of veterinary students in the colleges of the United States and Canada shows an increase. This year the increment is 303, compared with 332 a year ago, and 316 two years ago. These increases, however, are more apparent than real, for the following reasons. During the past five years, our figures have included pre-veterinary students registered in those colleges providing a year of special instruction in pre-veterinary subjects. The report for the college year 1931-32 was the last one not to include any pre-veterinary students. The number of veterinary students enrolled in the four classes of all colleges for that year was 1,388. To get a comparable figure for the current year, we must deduct from the total enrollment the number of pre-veterinary and post-graduate students reported. This gives us a net total of 1,951 regular students in the twelve veterinary colleges. Using these figures, we find that the number of students enrolled in the four classes in all colleges has increased 563 in five years, or about 112 per year, or less than ten students per year for each college, which is not such a large increase.

This year, for the first time, all veterinary colleges in the United States required a year of pre-veterinary work for entrance. This appears to have had no appreciable effect upon the number of freshman students enrolled, as the total of 629 is only slightly below the corresponding figure for last year, which was the highest for about two decades.

Of more importance than the number of students is the number who actually complete the course and are graduated. Examination of the records showing the number of graduates each year for the past decade fails to disclose that there has been any overproduction of veterinarians. Keep in mind the fact that, as recently as 1927, the number of graduates reached the low point of 122. Then there was a slight increase each year, up to and including 1935, when 368 graduates were reported for the twelve veterinary colleges. This year (1936) the number of graduates declined to 313, and the number of senior students enrolled this fall would indicate that the number of graduates for 1937 will not exceed the number for 1936. The indications are, however, that the number of graduates in 1938 will be larger, if the number of junior students registered this year may be taken as a basis for the prediction.

At least six of our colleges have taken steps to restrict the number of veterinary students admitted. This has had the perfectly natural result of causing a considerable number of students to turn to other institutions where there are no restrictions. Dean Hagan reports that of 240 applicants for admission to the New York State Veterinary College at Cornell University, up to August 1, only 40 were accepted. Dean Dykstra reports that over 200 prospective veterinary students were turned away from Kansas State College, in order to keep the registration down to the limit specified by the officials of the institution. Acting Dean McAdory reports that Alabama Polytechnic Institute turned away over 400 students who wanted to study veterinary medicine at that institution.

One of the most serious problems confronting the veterinary profession today is the case of the prospective veterinary student who is located in a state not maintaining a veterinary college. It is perfectly natural that an institution which has found it necessary to limit the enrollment of veterinary students will give preference to applicants whose homes are located in that state. In some of the colleges where a definite limit has been placed on the number of veterinary students admitted, residents of the state have been more than sufficient to fill the quota.

In studying the accompanying table and noting the number of pre-veterinary students reported, there are several facts to be kept in mind. Eight colleges report 529 pre-veterinary students. Cornell and Pennsylvania do not recognize pre-veterinary students as such. The two Canadian schools do not require the pre-veterinary year. Now, in addition to the 529 students who have definitely indicated an intention to study veterinary medicine by enrolling in institutions offering regularly outlined courses in pre-veterinary subjects, there are others (the number cannot be stated) who are doing the same thing in colleges and universities not having veterinary courses. From the information available, it is quite evident that there are more students, who are taking pre-veterinary studies, than the colleges can possibly accept. For example, 108 students took pre-veterinary work at the State College of Washington last year, but only 40 of these were allowed to enroll as freshmen at Pullman this fall.

If the proposal of the American Veterinary Medical Association to classify our veterinary colleges has had any effect on the smaller, less adequately supported institutions, this is not noticeable in the enrollment figures. All of the colleges, even those which have restricted admissions, appear to have about as many students as they can comfortably accommodate. Some appear to be a bit crowded. For the year 1926-27 Alabama had a total of 17 veterinary students enrolled in the four classes; this year there are 42 freshmen at Auburn. The number of students at Colorado has more than trebled in ten years, and the number at Kansas has more than quadrupled in the same period. Michigan had eleven freshmen in 1926-27, as against 89 this year. The number in the two Canadian schools has more than trebled. Texas reported two freshmen for the year 1926-27, with a total of eleven students in the four classes. This year there are 43 freshmen at College Station. Washington had 14 freshmen in the fall of 1926, against 40 this year. Naturally the gains in the larger colleges have been less striking, although Ohio has more freshmen this fall than the entire number of students registered for 1926-27.

Where are we going to get teachers to take care of the steadily increasing number of veterinary students? This is a subject that has not received the attention it deserves. We have commented on the comparatively small number of veterinarians who pursue postgraduate work and it is a remarkable fact that during the past five years, when we have witnessed a steady increase in the enrollment of veterinary students, there has been a steady

decrease in the number of veterinarians taking postgraduate work in our veterinary colleges. In many lines of work it would be almost unthinkable for a teacher without graduate studies to his or her credit to be given a teaching position. In most instances an advanced degree is a requirement.

There is not a veterinary college in the country today that could not use additional teachers to advantage. Some are a long way off from the minimum number suggested by the Committee on Education, at Columbus, as acceptable for a class A school.

Veterinary student enrollment for the college year 1936-1937

COLLEGE	FR.	SOPH.	JUN.	SEN.	SPEC.	GRD.	TOT.	1935-36	CHG.
Alabama Poly. Inst.	42	25	40	33	49*	2	191	181	+ 10
Colorado State Coll.	43	32	17	8	61*	0	161	156	+ 5
Cornell University..	40	44	32	36	0	5	157	136	+ 21
Iowa State College..	59	48	53	32	57†	4	253	240	+ 13
Kansas State College	72	68	40	34	65*	0	279	311	- 32
Michigan State Coll.	89	30	32	25	47*	5	228	143	+ 85
Montreal, Univ. of..	19	13	10	7	0	0	49	43	+ 6
Ohio State Univ....	63	48	59	19	118‡	3	310	304	+ 6
Ontario Vet. College	67	60	58	34	0	0	219	203	+ 16
Penna., Univ. of....	52	51	29	47	15	0	194	187	+ 7
Texas A. & M. Coll..	43	65	48	18	61*	2	237	168	+ 69
Washington, S. C. of	40	22	52	29	80*	0	223	126	+ 97
Totals (1936-37)...	629	506	470	322	553	21	2501	2198	+303
Last year (1935-36)	668	480	332	330	369	19	2198	1866§	+332

*Pre-veterinary students.

†Includes 55 pre-veterinary students.

‡Includes 111 pre-veterinary students.

§Total number of students for 1934-35.

ANIMAL DISEASE REPORTING FOR ILLINOIS

Under date of September 10, 1936, Mr. Walter W. McLaughlin, Director of the Illinois Department of Agriculture, addressed a communication to the veterinarians of Illinois, relative to the reporting of infectious and communicable diseases of animals, something that has not been done in a regular, systematic way, although a law has been on the statute books in Illinois for a good many years, making the reporting of such animal diseases mandatory upon the part of veterinarians.

The plan to develop some sort of a reporting system was sponsored by the Executive Committee of the Illinois State Veterinary Medical Association, which first studied the situation and

then recommended to the Illinois Department of Agriculture that some plan be inaugurated. In his letter to the veterinarians of Illinois, Mr. McLaughlin stated that he considered that there was much of merit in the suggestion and that his Department would be glad to cooperate with the State Association in securing, compiling and publishing the information.

Under date of October 16, Dr. C. C. Hastings, secretary-treasurer of the Illinois State Veterinary Medical Association, sent a letter to all veterinarians in the state, directing attention to a postal card that has been adopted for the purpose of reporting animal diseases to the Department of Agriculture. In his letter, Dr. Hastings pointed out that in the plan was an opportunity for the state officials and the members of the State Association to work together for the benefit of the live stock industry of Illinois. He went on to say that the success of the plan, as well as any benefit derived from it, would depend entirely upon the cooperation given by the practitioners in making their reports regularly, promptly and accurately.

It is no secret that veterinarians frequently make the statement, with pardonable pride, that the United States is the safest country in the world for the investment of capital in live stock. This boast is made with the knowledge that the veterinary profession has never been found wanting when an opportunity was presented for it to cope with a serious animal disease. Furthermore, the statement usually is made on the assumption that the live stock population of the United States is comparatively free of communicable diseases. However, we will have to acknowledge that, with the possible exceptions of bovine tuberculosis and Bang's disease, we do not have reliable, up-to-date information on the extent of losses caused by infectious and parasitic diseases of animals for the country as a whole. We do know about what percentage of the cattle in the country have been found to be infected with tuberculosis, and sufficient work has been done with Bang's disease to give us a pretty good estimate of the extent of that disease among the cattle of this country. However, there we must stop.

At the present time, there is one important factor that stands in the way of securing complete information relative to the existence of a number of animal diseases. It is a fact that many cases never come to the attention of qualified veterinarians. Take hog cholera, for example, in those states where lay vaccination is the vogue. Just as long as the responsibility for the control of hog cholera remains divided, we will remain in ignorance of the toll which this disease takes each year. The same thing

could be said of several internal parasitisms of animals, thousands of cases of which are treated each year by the owners themselves, county agents, vocational teachers of agriculture, peddlers and itinerant quacks. No reporting system ever will be entirely adequate until veterinarians are given the undivided responsibility of handling infectious and contagious diseases of animals. In this connection we have in mind particularly such diseases as hog cholera and rabies. It seems to be just about everybody's business to meddle with these two diseases.

GOOD PUBLICITY

Nearly 300 newspapers in the principal hog-producing states have indicated a desire to receive the series of educational articles on Animal Health which have been prepared by the Associated Serum Producers for release in connection with its 1936-37 educational and advertising campaign.

The educational articles are credited to the American Foundation for Animal Health, recently set up by the Associated Serum Producers as a medium for disseminating information on animal diseases to the public. Under the head, "Health Hints for Live Stock," the articles will follow the general style of syndicated articles on human health found on the feature pages of many newspapers.

Subjects discussed in the articles include hog cholera, swine erysipelas, infectious enteritis and other serious diseases. Each article emphasizes the importance of calling the local veterinarian whenever there are signs of sickness. The danger of allowing persons not professionally qualified to diagnose and treat animal diseases is stressed.

EXECUTIVE BOARD ELECTION

The special election in Executive Board District 10 (Michigan and Ohio) is still in progress and will continue until the polls are closed on November 25. This election is being held to choose a successor to Dr. Oscar V. Brumley, of Columbus, Ohio, president-elect of the A.V.M.A. Dr. Brumley continues as a member of the Board in an ex-officio capacity. His successor will fill out his unexpired term. In view of the fact that District 10 continues to have representation on the Board, through Dr. Brumley, President Foster has indicated that he would make no temporary appointment to the Board from District 10. The voting to date has been rather light. Only 117 ballots have been returned.

APPLICATIONS FOR MEMBERSHIP

The month of October, 1936, broke all records for that month, in the number of applications for membership received. Prior to this year, 1928 was the best October on record, with 40 applications filed. This year October beat the record by ten. Another way to emphasize the splendid showing of the past month is to point out that the number of applications given first listing this month exceeds the combined totals of the same month for the six preceding years (1930 to 1935 inclusive). October just doubled September, which was a pretty good month. Eight months of 1936 have bettered the corresponding months of 1935.

Let it be known that President Foster is out to have his administration do even better than that of Dr. Flynn, his immediate predecessor, who closed his year with 301 new applications received and 463 former members reinstated.

(See July, 1936, JOURNAL)

FIRST LISTING

- ADAN, LT. CIRILO Fort Meade, S. Dak.
 B. Sc., Kansas State College, 1932
 D. V. M., Kansas State College, 1934
 Vouchers: Lt. Col. Jesse D. Derrick and Maj. E. L. Nye.
- ALLEN, LT. JOHN K. 2555 Bryant Ave. S., Minneapolis, Minn.
 D. V. M., Iowa State College, 1934
 Vouchers: Lt. Col. Jesse D. Derrick and Maj. J. G. Fuller.
- ANDRES, LEO E. Remington, Ind.
 D. V. M., Ohio State University, 1932
 Vouchers: J. L. Axby and Walter K. York.
- ANDREWS, CAPT. ASA R. Presidio of San Francisco, Calif.
 D. V. M., San Francisco Veterinary College, 1916
 Vouchers: Col. A. L. Mason and Capt. C. L. Taylor.
- ASBILL, LT. STEPHEN G. 302 A. St., Davis, Calif.
 D. V. M., Kansas State College, 1935
 Vouchers: John D. Paxton and Col. A. L. Mason.
- BERTZ, CAPT. WESLEY W. Carlisle Barracks, Pa.
 D. V. M., Kansas State College, 1930
 Vouchers: Maj. Frank H. Woodruff and Col. Robert J. Foster.
- BROAD, CAPT. FAY E. 802 N. Michigan, Plymouth, Ind.
 D. V. M., McKillip Veterinary College, 1917
 Vouchers: Maj. F. L. Holycross and J. L. Axby.
- CAIRY, LT. CLYDE F. 4900 Morningside Ave., Sioux City, Iowa
 D. V. M., Iowa State College, 1936
 Vouchers: Lt. Col. Jesse D. Derrick and Maj. J. G. Fuller.
- CARLL, LT. WALTER T. Fort Hoyle, Md.
 D. V. M., Cornell University, 1935
 Vouchers: Col. Robert J. Foster and Maj. Frank H. Woodruff.
- CASTLEBERRY, CAPT. GUY 1140 E. 8th South St., Salt Lake City, Utah
 D. V. M., Kansas City Veterinary College, 1915
 Vouchers: Lt. E. L. Henkel and A. T. Kinsley.

- CHASTAIN, CAPT. WALTER R. Station F, Box 3192, Jacksonville, Fla.
D. V. M., University of Georgia, 1929
Vouchers: Col. B. A. Seeley and J. G. Fish.
- CRUSE, CHARLES L. 906 Northwest Blvd., Winston-Salem, N. C.
D. V. M., Kansas City Veterinary College, 1914
Vouchers: C. D. Grinnells and J. H. Brown.
- DEAL, LT. ALFRED F. C. C. C. Camp S-71, Lake Placid, N. Y.
D. V. M., Cornell University, 1914
Vouchers: Lt. Col. Clell B. Perkins and C. P. Zepp.
- DOBSON, CHARLES C. New Augusta, Ind.
D. V. M., Indiana Veterinary College, 1911
Vouchers: Walter K. York and W. B. Massie.
- ELLIS, CAPT. HARVIE R. Fort Riley, Kan.
D. V. M., Texas A. & M. College, 1928
Vouchers: Col. Robert J. Foster and Lt. Col. Jean R. Underwood.
- ESTES, ROBERT F. Orange, Va.
D. V. M., Iowa State College, 1933
Vouchers: I. D. Wilson and L. E. Starr.
- GERRY, RUSSELL W. 8474 Melrose Ave., West Hollywood, Calif.
D. V. M., Iowa State College, 1934
Vouchers: W. L. Curtis and G. W. Blanche.
- GREENE, LT. JAMES E. 107 E. John Calvin St., College Park, Ga.
D. V. M., Alabama Polytechnic Institute, 1933
Vouchers: Col. B. A. Seeley and J. W. Thome.
- HARTER, WILLIAM L. 351 N. Foothill Rd., Beverly Hills, Calif.
D. V. M., Iowa State College, 1933
Vouchers: W. L. Curtis and Eugene C. Jones.
- HARVEY, MARVIN H. 9088 Santa Monica Blvd., West Hollywood, Calif.
D. V. M., Colorado State College, 1932
Vouchers: W. L. Curtis and Eugene C. Jones.
- HIBBS, LT. LEONARD W. 927 Cleveland, Kansas City, Kan.
D. V. M., Kansas State College, 1935
Vouchers: F. W. Crawford and Maj. J. G. Fuller.
- HIGBY, LT. WILLARD C. Turin, N. Y.
D. V. M., Cornell University, 1935
Vouchers: Lt. Col. Clell B. Perkins and C. P. Zepp.
- HOCK, CAPT. LEO A. 725 Thurman Ave., Columbus, Ohio
D. V. M., Ohio State University, 1917
B. Sc., Ohio State University, 1928
Vouchers: Maj. F. L. Holycross and W. R. Krill.
- HUBER, LT. SAMUEL F., JR. Y. M. C. A., Schenectady, N. Y.
D. V. M., Cornell University, 1935
Vouchers: Lt. Col. Clell B. Perkins and C. P. Zepp.
- ISHÉE, LT. VAUGHN E. Veterinary Station Hospital, Fort Knox, Ky.
D. V. M., Ohio State University, 1935
Vouchers: Maj. C. S. Williams and Maj. F. L. Holycross.
- KELLEY, LT. DONALD C. 20-21 Arnold Hall, Fort Riley, Kan.
D. V. M., Kansas State College, 1935
Vouchers: Lt. Col. Jesse D. Derrick and Lt. Col. J. E. Behney.
- KERR, VIRGIL M. Box 1086, Sacramento, Calif.
D. V. M., Colorado State College, 1934
Vouchers: Ernest F. Chastain and L. E. Saint Clair.
- KIELSMEIER, MAJ. SAMUEL G. Fort Oglethorpe, Ga.
D. V. M., Chicago Veterinary College, 1916
Vouchers: Col. B. A. Seeley and Lt. Col. Horace S. Eakins.

- KRUKOWSKI, LT. STANLEY M. 425 Taylor Ave., Collingswood, N. J.
D. V. M., Cornell University, 1935
Vouchers: Lt. Col. Clell B. Perkins and C. P. Zepp.
- MCBRIDE, NORMAN L. 1021 Davis St., Evanston, Ill.
D. V. M., Chicago Veterinary College, 1914
Vouchers: Geo. P. Frost and E. L. Quitman.
- MAGENS, CAPT. HANS J. 619 S. Cedar, Little Rock, Ark.
V. S., Tierärztlichen Hochschule, Vienna, Austria, 1922
Vouchers: Lt. Col. Jesse Derrick and Rease Mitcham.
- MOSES, HAROLD E. Ohio State University, Columbus, Ohio
D. V. M., Ohio State University, 1936
Vouchers: W. F. Guard and A. F. Schalk.
- MYDLAND, LT. HALDOR T. 307 Metz Apt., 2009 Summit, Sioux City, Iowa
D. V. M., Kansas State College, 1934
Vouchers: Lt. Col. Jesse Derrick and R. R. Dykstra.
- NIEMEYER, THEODORE J. 2121 Pico Blvd., Santa Monica, Calif.
B. S., D. V. M., State College of Washington, 1932
Vouchers: W. L. Curtis and Eugene C. Jones.
- REESE, LT. WILLIAM C. Earlville, N. Y.
D. V. M., Cornell University, 1935
Vouchers: Lt. Col. Clell B. Perkins and C. P. Zepp.
- RISER, WAYNE H. Glenwood, Iowa
D. V. M., Iowa State College, 1932
Vouchers: E. C. Jones and H. C. Smith.
- SAUNDERS, LT. CHARLES M. Fort Missoula, Mont.
B. S., D. V. M., State College of Washington, 1935
Vouchers: E. A. Ehmer and Lt. F. J. Bolender.
- SEAGERS, LT. WILLIAM J. Apt. 9, 47 Cedar St., Binghamton, N. Y.
D. V. M., Cornell University, 1935
Vouchers: Lt. Col. Clell B. Perkins and C. P. Zepp.
- SEIBERT, ZEN W. Crestline, Ohio
D. V. M., Ontario Veterinary College, 1901
Vouchers: B. W. Groff and R. S. Smiley.
- SHIPLEY, LT. WAYNE D. 226 Sixth Ave., Columbus, Ga.
D. V. M., Colorado State College, 1935
Vouchers: Col. B. A. Seeley and E. A. Davis.
- SHOAF, CAPT. WALTER P. 217 Buena Vista, Paris, Ill.
D. V. M., Indiana Veterinary College, 1920
Vouchers: Lt. Col. Mott Ramsey and C. C. Hastings.
- SPRING, LT. JACOB E. 608 E. Missouri Ave., Saint Joseph, Mo.
D. V. M., Kansas State College, 1935
Vouchers: Col. B. A. Seeley and G. J. Lawhon.
- TIERNEY, LT. WILLIAM F. 38 S. Hermitage Ave., Trenton, N. J.
D. V. M., Cornell University, 1935
Vouchers: Lt. Col. Clell B. Perkins and C. P. Zepp.
- TRUM, LT. BERNARD F. Army Veterinary School, Army Medical Center,
Washington, D. C.
A. B., Boston College, 1931
D. V. M., Cornell University, 1935
Vouchers: Lt. Col. Jean R. Underwood and Maj. F. H. K. Reynolds.
- WHITFIELD, LT. JOHN S. Fort Oglethorpe, Ga.
B. S., Mississippi State College, 1931
D. V. M., Iowa State College, 1934
Vouchers: Col. B. A. Seeley and C. D. Crawford.

- WILDER, CLIFFORD W. Chatham, N. Y.
D. V. M., Ohio State University, 1935
Vouchers: W. F. Guard and W. R. Krill.
- WILKE, DAVID C. 7 Quincy Court, Pittsburg, Kan.
D. V. M., Saint Joseph Veterinary College, 1922
Vouchers: A. H. Holkenbrink and J. S. Clark.
- WILLIS, LT. ROBERT L. Fort Oglethorpe, Ga.
D. V. M., University of Georgia, 1932
Vouchers: Col. B. A. Seeley and W. K. Lewis.
- WINSTON, JAMES S. 9088 Santa Monica Blvd., West Hollywood, Calif.
B. S., D. V. M., State College of Washington, 1936
Vouchers: W. L. Curtis and Eugene C. Jones.
- YOST, CAPT. HURSH R. Somerset, Ohio
D. V. M., Ohio State University, 1914
Vouchers: Maj. F. L. Holycross and S. E. Hershey.

Applications Pending

SECOND LISTING

(See October, 1936, JOURNAL)

- Current, Jay B., Topeka, Ind.
Ehrlich, Lt. David, Company 234, C. C. C., Orange, N. J.
Emick, George C., Berne, Ind.
Fly, Glen O., 2356 N. High St., Columbus, Ohio.
Gray, Lyle A., Bushnell, Ill.
Greenfield, Alexander, 432 Hopkinson Ave., Brooklyn, N. Y.
Harrison, Joseph W., 722-3 State Office Bldg., Lansing, Mich.
Hubbard, Earl D., 1031 Elm St., Grinnell, Iowa.
Jackson, George W., Belgrade, Neb.
Jones, Lt. Thomas C., Presidio of Monterey, Calif.
Lange, Stephen W., Box 166, East Lansing, Mich.
Lindenstruth, Henry J., 305 W. Jackson St., Marshfield, Mo.
Live, Israel, University of Pennsylvania, Philadelphia, Pa.
Logsdon, Charles D., Lake City, Mich.
McNellis, Capt. Russell, Army Veterinary School, Army Medical Center,
Washington, D. C.
Mader, Clyde K., City Hall, Kitchener, Ont.
Martin, Adrian A., Box 171, Emmitsburg, Md.
Michael, Sidney J., 433 W. Ninth St., Erie, Pa.
Muniz, Carlos M., Trujillo St. No. 1, Ponce, Puerto Rico.
Nichols, Lt. James B., Army Veterinary School, Army Medical Center,
Washington, D. C.
Orson, Oliver W., 240 S. Graham, Pittsburgh, Pa.
Stevenson, Lt. Daniel S., Army Veterinary School, Army Medical Center,
Washington, D. C.
Tekse, Lt. Lloyd C., Army Veterinary School, Army Medical Center,
Washington, D. C.
West, R. Leland, Jr., Waseca, Minn.
Ziegler, Charles G., 833 Frederick Ave., Catonsville, Md.

The amount which should accompany an application filed this month is \$5.83, which covers membership fee and dues to January 1, 1937, including subscription to the JOURNAL.

COMING VETERINARY MEETINGS

- Central New York Veterinary Medical Association. Onondago Hotel, Syracuse, N. Y. November 5, 1936. Dr. W. B. Switzer, Secretary, R. 5, Oswego, N. Y.
- Ak-Sar-Ben Veterinary Medical Association. Elks Building, Omaha, Neb. November 9, 1936. Dr. J. N. McIlnay, Secretary, 3251 Leavenworth St., Omaha, Neb.
- San Diego County Veterinary Medical Association. San Diego, Calif. November 10, 1936. Dr. Donald E. Stover, Secretary, Zoölogical Research Bldg., Balboa Park, San Diego, Calif.
- Hudson Valley Veterinary Medical Society. Albany, N. Y. November 11, 1936. Dr. J. G. Wills, Secretary, Box 751, Albany, N. Y.
- Willamette Valley Veterinary Medical Association. November 11, 1936. Dr. Elwyn W. Coon, Secretary, Forest Grove, Ore.
- Illinois Veterinary Conference, University of. University of Illinois, Urbana, Ill. November 12-14, 1936. Dr. Robert Graham, Division of Animal Pathology and Hygiene, University of Illinois, Urbana, Ill.
- Kansas City Veterinary Association. Baltimore Hotel, Kansas City, Mo. November 17, 1936. Dr. C. C. Foulk, Secretary, 1103 E. 47th St., Kansas City, Mo.
- Massachusetts Veterinary Association. Hotel Westminster, Boston, Mass. November 18, 1936. Dr. H. W. Jakeman, Secretary, 44 Bromfield St., Boston, Mass.
- Mississippi Valley Veterinary Medical Association. Galesburg Club, Galesburg, Ill. November 18, 1936. Dr. Lyle A. Gray, Secretary, Bushnell, Ill.
- Southern California Veterinary Medical Association. Chamber of Commerce Building, Los Angeles, Calif. November 18, 1936. Dr. L. E. Pike, Secretary, 1220 Bennett Ave., Long Beach, Calif.
- Northwestern Illinois Veterinary Medical Association. Freeport, Ill. November 23, 1936. Dr. R. E. Kluck, Secretary, 220 W. Spring St., Freeport, Ill.
- Keystone Veterinary Medical Association. School of Veterinary Medicine, University of Pennsylvania, Philadelphia, Pa. November 25, 1936. Dr. J. A. Mehan, Corresponding Secretary, 39th St. and Woodland Ave., Philadelphia, Pa.
- Horse and Mule Association of America. Palmer House, Chicago, Ill. December 2, 1936. Mr. Wayne Dinsmore, Secretary, 407 S. Dearborn St., Chicago, Ill.

New York City, Veterinary Medical Association of. Hotel New Yorker, 8th Ave. and 34th St., New York, N. Y. December 2, 1936. Dr. R. S. MacKellar, Jr., Secretary, 329 W. 12th St., New York, N. Y.

Saint Louis District Veterinary Medical Association. Melbourne Hotel, Saint Louis, Mo. December 2, 1936. Dr. Milton R. Fisher, Secretary, 3678 Dover Pl., Saint Louis, Mo.

B. A. I. Veterinarians, National Association of. Hotel La Salle, Chicago, Ill. December 2-4, 1936. Dr. F. A. Imler, Secretary, Box 187, Kansas City, Kan.

United States Live Stock Sanitary Association. Hotel La Salle, Chicago, Ill. December 2-4, 1936. Dr. L. Enos Day, Secretary, 3933 Drexel Blvd., Chicago, Ill.

Houston Veterinary Association. Houston, Texas. December 3, 1936. Dr. D. B. Strickler, Secretary, 317 Federal Bldg., Houston, Texas.

Chicago Veterinary Medical Association. Palmer House, Chicago, Ill. December 8, 1936. Dr. O. Norling-Christensen, Secretary, 1904 W. North Ave., Chicago, Ill.

Nebraska State Veterinary Medical Association. Lincoln, Neb. December 8-9, 1936. Dr. J. D. Sprague, Secretary, David City, Neb.

Southeastern Michigan Veterinary Medical Association. Detroit, Mich. December 9, 1936. Dr. F. D. Egan, Secretary, 17422 Woodward Ave., Detroit, Mich.

South Dakota Veterinary Medical Association. Cataract Hotel, Sioux Falls, S. Dak. December 10-11, 1936. Dr. Geo. E. Melody, Secretary, Gettysburg, S. Dak.

Pennsylvania, Conference for Veterinarians at University of. School of Veterinary Medicine, University of Pennsylvania, Philadelphia, Pa. January 5-6, 1937. Dr. G. A. Dick, Dean, 39th St. and Woodland Ave., Philadelphia, Pa.

California State Veterinary Medical Association and University of California Veterinary Conference. University Farm, Davis, Calif. January 5-8, 1937. Dr. Chas. J. Parshall, Secretary, Brentwood, Calif.

Cornell University, Annual Conference for Veterinarians at. New York State Veterinary College, Ithaca, N. Y. January 7-8, 1937. Dr. W. A. Hagan, Dean, Cornell University, Ithaca, N. Y.

New Mexico Veterinary Medical Association. State College, N. M. January 8-9, 1937. Dr. T. I. Means, Secretary, Penn Road, Santa Fe, N. M.

THE GENERAL PRACTITIONER*

By T. A. SIGLER, Greencastle, Ind.

I am not here to talk to you on scientific subjects pertaining to the treatment of animals. That will be done in other sessions here and also at our short courses over the country. I am here to talk of the problems, past, present and future, of the general practitioner, his duties and responsibilities in the field of action. Last year, in Oklahoma City, Doctor Merillat pointed out the general ills of the entire profession, the weak points and the strong points. It is my purpose to deal solely with the general practitioner and his problems.

It was through the services of the general practitioner rendered to our beasts of burden, the horse and the ox, that veterinary science had its birth. Our background holds up all that is dear to the profession. All other ramifications of the profession sprang from the service rendered to a small and growing live stock industry.

The general practitioner must be all that the name implies, for he is consulted on all subjects pertaining to veterinary science, everything from keeping mice out of the hay to keeping lice off of hens.

A little specialization is all right, but over-specialization becomes dangerous to a general practitioner in the country, as other sources of revenue will lag. It takes everything that the name implies to make a successful general practitioner. He must take it mine-run.

Has the general practitioner been somewhat forgotten in the advance of the profession? When we met in Columbus in 1920, there was strong talk among the practitioners of that time, some going as far as to try to start a national organization of practitioners. They had a feeling that they were not recognized by the A. V. M. A. and were being put in the background by the college and regulatory men. This was far from being the case, for since that time, there have been several prominent practitioners placed at the head of this organization.

Doctor David S. White, in his presidential address at the meeting of the A. V. M. A. the next year, said in part: "Practice, research, teaching, regulatory work and the military must be ever interwoven and overlapping." He further said that no group of veterinarians representing one or two phases of the profession

*Presented at the seventy-third annual meeting of the American Veterinary Medical Association, Columbus, Ohio, August 11-14, 1936.

could divorce themselves from the main body without crippling all of us and in the long run doing none of us any good. It is essential, therefore, that the practitioner live on and carry his share of the load. At the same time, he must be recognized by all other branches of veterinary science.

Has the practitioner neglected his opportunities for pushing the profession forward? The small-animal practitioners, those specializing in the care of pets, have pushed their business, increased their facilities, modernized their hospitals, until they are quite as efficient as those who handle our human patients. Being a trustee of a county hospital for several years and traveling over the country, I find that some of these small-animal hospitals are as up-to-date and sanitary as our modern hospitals for humans.

Realizing that the practitioner in the field, in a country practice, can not handle the ponderous bull and stallion quite so easily, apparently, as his small-animal patients, and handicapped by insanitary conditions in most cases, it is up to us in general practice to improve our methods in every way we can and try to make capital out of handicap, by seeing to it that every sanitary measure and precaution is taken. We must not fall into the rut of slipshod fashion of merely getting by and trusting to luck.

With our knowledge of topographical anatomy, of asepsis and anesthetics, and the general use of chloral intravenously, we have robbed the handling of large animals of some of its hazards. In the field of action, where one has to practice alone, far away from modern hospital facilities, the practitioner must make the best of the situation. It is up to him today to keep up on all modern methods of applying his science.

THE VALUE OF A NEAT OFFICE

We know that most of the work of the general practitioner in small towns is done out in the field. This has caused him to neglect the appearance of his office. One drawback of the advancement of practitioners in small towns is that they so often do not have suitable and attractive quarters. The large-animal practitioner and the general practitioner, all too often, has his casting harness, twitches and ropes in the office, giving it more the appearance of the workshop of a general contractor than the office of a professional man. A neat, clean, well-kept office is a valuable asset to any practitioner, wherever he is located.

The practitioner is still the main cog in the wheel and it is up to us to hold up the ideals of the profession. Many times, contagious diseases, harmful to man as well as animals, are already

diagnosed before regulatory men are called in. Without the general practitioner in the field, many serious outbreaks have been traced to the lack of proper diagnosis and proper control measures by the laity or by handymen. It is only fitting and proper that the regulatory men, the agricultural colleges and the agricultural press should back up the cause of the practitioner. He is to the live stock industry what the family physician is to the home. A good veterinarian is to any community the same as good digestion to man and means the same thing.

On the other hand, the general practitioner, if properly organized and if he conducts himself as he should, takes part in the welfare of and has civic pride in his community. First of all, he makes his presence felt by holding up the standards and dignity of his profession. Theodore Roosevelt once said that every man owed some of his time and talent to the uplift of his profession, trade or calling and the political party with which he was affiliated.

As a man's professional interest lags, so lags his interest in the community. A man must study the whole category to eke out a good revenue in a community, pet stock and everything else. The community is dependent on the practitioner for everything. Short course progress is so essential to the profession and is advancing so rapidly that the general practitioner is standing in his own light if he does not attend. He should take every journal, for if he gets only one idea which will help his client, he is well paid for the investment. He can afford to economize, if he is serving the public, on everything except what affects his service to the public, thus acquiring the revenue which will enable him to enjoy life.

SUPPORT VETERINARY ORGANIZATIONS

Every man offering his services to the public as a veterinarian should belong to his state and national organizations. No organization, however strong it may be, can contribute anything to the practitioner unless he avails himself of it by contributing his part to the organization, recording cases and reporting his findings. We have three journals available for reporting your cases and findings, thus contributing to the practitioners' welfare.

What we need at the present time is more coöperation and a deeper interest taken in this Section on General Practice by the men in the field, and a closer affiliation between the state and national organizations. Our universities and associations, both state and national, are doing all in their power to help this special branch of science. No individual or organization can be helped who will not try to improve itself. Our modern short

courses, brought up to date by clinics with good programs, are offered to assist the practitioner.

When attending our state and national meetings, our drug and instrument supply houses should have displays that will show to the profession that the general practitioner is still playing an important part.

A PLACE FOR THE SPECIALIST

It is true that some work still remains the work of the specialist, as in the medical profession, in the dexterity of performing operations. As Professor Hobday said in his address, read at the Twelfth International Veterinary Congress in New York, the stripping of the ventricles of Morgagni and some of the abdominal operations, will always remain the work of specialists, because the practitioner does not have the opportunity to become proficient, with his limited opportunities.

One entering the profession, back in the time when some of us older members began to practice, would not recognize it today as the same profession, if he had not kept pace with the many changes. Many of the older men who dropped out when sudden changes came, and went into inspection work, if thrown back into the practice of today, would not recognize it. The ever-increasing demand for knowledge concerning food-producing animals affected with diseases communicable to man, the control of parasites, breeding problems, sterility, and nutritional diseases has broadened the field of general practice to the extent that we have to run like sixty to stand still.

Many young men entered the profession years ago for the thrill and romance of treating the spirited carriage horses and trotters, when our responsibility rested wholly with keeping that animal machine in repair. Today, the field has broadened to the extent that the young man entering the profession realizes, or must be led to realize, the responsibility resting on his shoulders.

With the millions of dollars invested in live stock, the immense amount of wealth threatened on all sides with pestilence, disease and parasites, with the ever-increasing danger of diseases communicable to man through animal-borne infections, it is up to the general practitioner to put his house in order, to keep abreast of the times, for this profession will and must endure.

It is up to the practitioner to help promote the profession, every branch of it, not only his but every other field. It is up to the extension man to help promote and encourage the practitioner in his line of work, otherwise they will kill the goose that laid the golden egg.

PREDATORY INTERESTS AT WORK

Predatory interests are usurping the practitioner's rights. Public paid regulatory men and extension men dabbling in the field of practice are part of the danger. If the practitioner is to function in the future as he has in the past, if this line of endeavor has proved a worthy cause, and through the practitioner's work in the control, diagnosis and treatment of diseases he can preserve the health and wealth of a nation, then his field must be kept one of a remunerative nature, in order that young men will take up this line of work and fill the ranks that death and age are fast depleting.

The future practitioner must of a necessity be an educated man, well versed in breeds and breeding, feeds and feeding, sanitation, and related subjects. He must be educated in all branches of his work, in diseases of wild as well as domestic life, in the plan of conservation in all lines, for parasites and diseases are threatening wild life and all life. If we are to control and finally eradicate disease, petty politicians must keep hands off, for human health and wealth are at stake.

Too often in our different states, men at the head of conservation departments, who look after the fish and game and fast-waning wild life, are paid in excess of the salaries of our state men who look after the welfare of our food-producing animals. I am not criticizing conservation work. It should be taught in our colleges. Diseases of wild animals and birds spread to domestic animals, and vice versa.

MILLIONS OF DOLLARS AT STAKE

For each state alone, the assessed money value will run into millions upon millions. Modern man has long since ceased to live on wild game and his very existence depends upon domestic food-producing animals. Man is an omnivorous animal and must live on flesh. We must make the lives of our food-producing animals safe, that we may exist. We are not yet ready for Henry Ford's mechanical cow.

We, as associations, should see that our heads of live stock departments are given decent salaries, so that these positions will attract veterinarians of the highest grade.

There are so many diseases, such as rabbit fever, rat-bite fever, anthrax, rabies, glanders, tuberculosis and many other diseases, animal-borne and pathogenic to man, that the general practitioner should be on his toes every minute, keeping on the lookout for

these things. It is up to the general practitioner to read anything and everything available that pertains to veterinary science, belong to his state and national associations, study the breeds of live stock, become proficient as a judge of animals, and serve in that capacity whenever possible.

There is much said about raising the entrance requirements to the veterinary departments of our colleges. We must have better educated men in the field. At the same time, we are making it appear, through the press and extension service, that it is so simple that a layman can treat his own live stock. This is the serious situation which confronts us. Much has been said and many articles read at our association meetings. It is high time for the heads of our agricultural colleges to go into a huddle with the leaders of our profession and talk these things over. We cannot turn out high-class practitioners on the one hand, and on the other turn out lay animal engineers, but this is the situation which confronts us today.

WHAT OF THE FUTURE?

What will happen to the profession within the next 25 years? They are turning out pseudo-veterinarians over night. What is the future veterinarian to be? What will the practitioner be? What will be his scope of knowledge? We can not stand still. We must advance or fall back. We have boasted, in the past, that this is the safest country in the world for the agriculturist to invest his dollars in live stock, and it was so before political influence, lay vaccinators and interference from all sides impeded the progress of veterinary science.

After all is said and done, the greatest laboratory and the greatest field of action is out in the field of practice. True it is that a good workman is worthy of his hire. Too many young men of high ideals and the ambition to render really worthwhile service have been driven out of the field of action to seek other lines where there is not so much outside interference. It is the mediocre one that usually hangs on in many localities.

True, our medical brothers have had to meet the situation of encroachment on their legitimate field, but no matter what fad or fancy leads a layman in search of relief, it is the practicing physician who finally signs his death certificate in the end. Without the general practitioner of medical science, what would the 120,000,000 people in our country do, with our rapid transit and our rapid spread of disease? Our health officers and boards of health would be helpless to render a service to suffering humanity.

There are none so selfish and shortsighted, but what they must know we are guardians of public health as well as wealth and if we are to control and finally eradicate diseases communicable to man, we must continue to expand, coöperate and work hand in hand with the medical profession.

Many fine articles have appeared recently in our trade journals and they are doing all in their power to improve the field, realizing that publicity is limited to a degree and our associations, both state and national, must try and continue to improve the field by proper advertisement.

It is necessary, for the advancement of science, that our laboratory men experiment on animals. There are those selfish interests that would tie the hands of science. Therefore, it is necessary for the practitioner to exert his influence in his community against dangerous legislation that would stop scientific progress.

CONCLUSIONS

In conclusion, I wish to say that Doctor Adams once stated that the general practitioner was the backbone of the veterinary profession and from this group have sprung all other ramifications and all the results of the handiwork of the general practitioner of veterinary medicine.

Ours is one of the noblest of callings, one of man's greatest contributions to mankind and animals, one of the greatest assets to the conservation of all life. One who possesses a degree in veterinary science can well hold his head high. He is a public benefactor and not a parasite in any sense of the word.

The man who really applies himself, works, thinks and serves, contributes far more than he gains in material wealth. It will be a sorry day for all mankind when they try to dispense with the services of the general practitioner. The field must ever be kept open for the general practitioner, for the up-to-date practitioner must and will live on.

Advances in veterinary science are occurring daily. Therefore, it is necessary that our associations see to it that proper information reaches the public, giving credit where credit is due. At the present time, the general public is uninformed on the wonderful advances in veterinary science.

I wish to appeal to this body, that we may have some avenue through which to get this necessary information to the general public. This is not asked in the selfish interest of the practitioner alone, but for the benefit of this entire profession. What affects one branch of our profession necessarily affects all branches.

INJURIES IN THE REGION OF THE HIP IN SMALL ANIMALS*

By ERWIN F. SCHROEDER, *Boston, Mass.*

Angell Memorial Hospital

In a survey of 1,200 cases of fractures and dislocations resulting from various causes, we found that injuries in the region of the hip represented approximately 15 per cent of the total, and that approximately 80 per cent of this total were represented by luxations of the coxo-femoral articulation. Next in frequency were fractures of the acetabulum, fractures of the femoral neck, and detachment of the proximal femoral epiphysis. Also, there were cases of multiple injuries such as pelvic fracture with dislocation of the femoral head, fracture of the femoral neck with luxation of the femoral head, and so forth. The incidents of fracture and dislocation would probably be more numerous if accurate diagnoses were made of all injuries presented for examination. Many cases of old unreduced dislocations presented at our clinic have indicated this to us.

CAUSES

The causes are great in variety. The automobile is responsible for the majority of these injuries, according to the records. Other causes are: falling or jumping from second stories, being kicked, tossed or thrown by an antagonist in a fight, playing with children, being hit with a sleigh, jumping over fences, running down a grade or an embankment, falling down a stairway, slipping on a polished floor, and so forth.

MECHANICS OF LUXATION

The frequency of luxation as compared to other injuries at the hip is probably due to the susceptibility of this joint to sprains. This may be because the head of the femur is not protected by strong ligaments. The shaft of the femur acts as the long arm of a lever against the femoral head, which is held in the acetabulum by the comparatively weak capsule and the equally weak round ligament. Dislocation results from an indirect force transmitted through the shaft when the limb is suddenly extended and simultaneously abducted or adducted beyond the normal range when alighting in an unbalanced posture, in falling, jumping or being hit and tossed. It is conceivable that the weight of the animal plus the force of a fall transmitted to an extended

*Presented at the seventy-third annual meeting of the American Veterinary Medical Association, Columbus, Ohio, August 11-14, 1936.

and abducted thigh would bring the leverage on the head of the femur, causing it to leave the acetabulum through a rent in the under and anterior portion of the capsule, resulting in an anterior dislocation. Likewise, it may be assumed that alighting with the extended lower limb and flexed in an adducted position at the hip would cause a rent through the upper and posterior part of the capsule, resulting in a posterior dislocation. In the immature animal, the resultant injury may be a slipping or a complete detachment of the proximal femoral epiphysis. There are individual cases in all breeds where there is a susceptibility to dislocation from a faulty conformation, a common fault being a shallow and ill-defined acetabulum (figs. 1 and 2).

Fracture of the femoral neck may result from the same causes and in the same manner, that is, strain transmitted through the femoral shaft to the femoral neck in alighting on the unbalanced extended limb, or from a sudden twist while the animal is struggling while being restrained in handling, and so forth.

Fracture of the acetabulum is usually caused by direct force applied laterally to the hip as in being hit by an automobile, falling and alighting on the hip, being kicked by a horse, and so forth.

ANATOMY

The *hip* region is formed by the acetabular portion of the innominate bone and the proximal end of the femur.

The *acetabulum* is a cup-like, hemispherical cavity situated on the lateral border of the pelvis at the somewhat raised eminence formed by the union of the ilium, ischium and pubis. It is approximately one-third of the distance nearer to the tuber ischii than it is to the external angle of the ilium. Its cavity faces outward and obliquely downward and slightly forward. It is deepened by the glenoidal cartilage attached to its margin.

The *upper end of the femur* consists of the head, neck, upper portion of the shaft and the trochanters—major and minor. The head of the femur is hemispherical in shape and is surmounted on the short neck which faces inward and upward, forming an angle of about 125 degrees with the medial border of the shaft.

The *trochanter major* is a prolongation of the shaft, rising above the base of the neck, and is directly external to it. It is on a level with the center of the femoral head. It serves as a point of insertion for some of the abductors and short rotators of the hip and it is the most important landmark used as a guide in the examination of the hip.

The *trochanter minor* is a conical process which projects from the posterior and inferior portion of the base of the neck at its

junction with the shaft. It serves as a point of insertion for the ilio psoas muscle and, therefore, serves as a lever for rotary and flexion displacements for the femoral shaft in luxation of the femoral head, acute flexion and outward rotation for the upper fragment in fractures below its junction with the shaft, a definite outward rotation of the thigh in fracture of the femoral neck, and detachment of the proximal femoral epiphysis.

The thigh forms an angle of about 100 to 110 degrees with the long axis of the ilium in the normal standing position of moderate flexion.

The *hip joint* is a ball and socket joint formed by the femoral head and the acetabulum. The femoral head is held in place within the acetabulum by the capsule which arises from the margin of the acetabulum and the glenoidal cartilage (or cotyloid ligament) and extends downward around the neck (like a mantle) to be attached to the region around the femoral neck near the articular margin.

The *round ligament* is intra-articular. It arises from the fossa acetabuli and attaches to the small depression on the inner side of the femoral head. In addition to strengthening the joint, it furnishes in the growing animal a small nutrient vessel for the femoral head. The joint is strengthened in front by the ilio psoas and the rectus femoris muscles, above by the gluteal and the short rotator muscles, on the inside by the adductors and posteriorly by the tendons of insertion of the external obturator and quadratus femoris muscles.

Movement of the hip: (a) Flexion in the sagittal plane is allowed until the thigh is practically parallel to the long axis of the pelvis. The muscles producing flexion are the ilio psoas, the rectus femoris, and the sartorius.

(b) Extension is possible to within about 45 degrees with the long axis of the pelvis (posteriorly). The muscles producing extension are the gluteal and hamstrings.

(c) Abduction is possible to about 45 degrees. The muscles involved are the gluteal and the tensor fascia lata.

(d) Adduction (possible to about 45 degrees) is produced by the inner group of thigh muscles.

(e) Internal rotation to about 30 degrees is checked by the tensed capsule and produced chiefly by the superficial gluteus.

(f) External rotation of 45 degrees is possible. It is produced by the middle and deep gluteal and the internal obturator, the external obturator, gemelli, and the quadratus femoris muscles. In addition to these muscles, in case of a luxation of the femoral head, the ilio psoas exerts a very strong outward rotation of the

femoral shaft, and a decided flexion and outward rotation of the upper fragment in fracture, including the trochanter minor in the upper fragment.

GENERAL EXAMINATION

The visible and palpable landmarks in the average dog are: In viewing the pelvis from behind, the innominate bones appear parallel to the median plane. On noting the posture, the pelvis should be symmetrical, the external angles of the ilia and the tubera ischii should be on a level with their respective opposites, the thighs and limbs appear equal in length, and the stifles and toes should point toward the elbow and toe of the corresponding forward limb.

Viewed from the side, the innominate bones are oblique in the anterior-posterior direction with regard to the horizontal plane, a distinct slope from the iliac crest to the tuber ischii. A line from the external angle of the ilium to the lateral border of the tuber ischii will pass directly over the trochanter major. It is a visible elevation in the medium-fleshed, short-haired animal. Abnormal elevation or change of position as compared with the normal may be detected by sight, and definitely located by palpation in all animals.

EXAMINATION OF THE HIP

1. Place the animal on the floor in the standing position (if able to stand). Observe and compare the posture of the limbs and note any irregularity. Have the animal walk (if possible) to observe the motion at the hips and the position assumed by the thigh and lower limb.

2. The examination is continued by placing the animal on the examination table. It is usually at this stage that an anesthetic is administered to complete the examination. This depends upon the preliminary findings, the general condition, and the temperament of the animal. A complete examination without the use of an anesthetic is not always possible.

The manipulations for determining the integrity of the pelvis are made by springing the tubera ischii and the ilia. A definite resistance to forcible springing of the ischia eliminates fracture of the ischial shaft and a possible separation of the symphysis. A similar springing of the ilia will elicit or eliminate fracture of the ilial shaft, and also prove or disprove the integrity of the sacro-iliac articulation. In either case, when evidence of fracture is found on springing, a digital rectal palpation is made. The external manipulations are repeated, and in this manner it is possible to detect fracture and at the same time define the frac-

ture line and the displacements of fragments within the pelvis by feeling irregularities in the bony contour and abnormal position of the fragments quite accurately. This is especially helpful in the examination and diagnosis for intrapelvic dislocation in fractures involving the acetabulum.

3. Examination for the integrity of the hip is made by palpation of the trochanters. The points to be determined are: (a) Is the limb shortened? (b) Is the trochanter elevated? (c) Is the trochanter rotated outward or inward?

(a) Method for measuring the length of the limb: The animal is placed on its back (an assistant holding the front limbs by the elbows) and the operator, standing behind the animal, grasps the thighs at the stifle, forcing the stifle and the tarsus into extension. The limbs are then simultaneously flexed and extended on the hip, and the length in the three positions is compared, that is, flexion, extension and vertical.

(b) Elevation or depression of the trochanter is determined by comparing the positions of the palpable proximal extremities of the trochanters in relation to the line extending from the external angle of the ilium to the lateral border of the tuber ischii. Elevation of the trochanter above this line is characteristic of coxo-femoral dislocation, fracture of the femoral neck, detachment of the proximal epiphysis, or fracture of the ilial and ischial shafts with an upward displacement of the intact coxo-femoral articulation. Depression of the trochanter denotes fracture of the acetabulum with intrapelvic displacement of the femoral head.

(c) Method for determining the outward and inward rotation of the trochanter: The space between the trochanter and the tuber ischii should be the same on both sides of the normal hip. This is determined with the thighs directed in a like posture. It is best to examine the normal side first and then compare the spacing on the injured side with it. The space between the trochanter and the tuber ischii is readily defined by deep palpation. By holding the thumb fixed in this space and performing passive motions of the thigh with the free hand, it is possible to test the integrity of the joint. On flexion of the thigh at the hip, the trochanter will crowd the thumb toward the ischium; on extension, it moves forward and away from the thumb. On adduction, the tip of the trochanter may be felt moving away from the median plane; and on abduction, moving toward the median plane. On rotation of the limb, and on circumduction, it is possible to detect motion of the tip of the trochanter in a definite arc, proving a fixed position of the femoral head within the



PLATE I
Figures 1 to 8

acetabulum and an intact femoral neck. An intact coxo-femoral articulation will impart a feeling of definite resistance to an upward pressure of the thigh against the hip. The trochanters in a normal hip are spaced equidistant from the tubera ischii, and the tip of the trochanter is lateral in relation to the acetabulum in flexion and extension. The thighs should be directed forward, with the stifle and toes pointing toward the elbow and toes of the corresponding front limb. Outward or inward rotation is not a normal posture.

DIAGNOSIS

Coxo-femoral dislocation: The type of dislocation is determined by the position assumed by the displaced femoral head in its relation to the acetabulum.

Anterior dislocation: This is the most common type (figs. 3, 4 and 5). Practically 90 per cent of all coxo-femoral dislocations fall into this class. The displaced femoral head rests laterally on the ilium, above and anterior to the acetabulum. It is characterized by:

- (1) Outward rotation of the thigh.
- (2) Abduction of the thigh (fig. 6).
- (3) Shortening (from one-half to two inches) of the extended limb.
- (4) Elevation and outward rotation of the trochanter.
- (5) Supporting and swinging-leg lameness.
- (6) A radiograph (fig. 7) is taken to verify the findings; to eliminate or include the presence of fracture; to correct mistakes in diagnosis.

Dorso-lateral dislocation: The femoral head rests directly above the acetabulum (fig. 8). It is characterized by:

- (1) Absence of the extreme outward rotation as seen in the former.
- (2) A more decidedly appearing fixed abduction.
- (3) Very slight or no shortening on extension. Longer than the normal limb in the vertical position.
- (4) A decided elevation and a lateral prominence of the trochanter.
- (5) Supporting and swinging-leg lameness. Limb carried in abduction.
- (6) Radiograph. Two views (extension and flexion), with the animal placed on its back. Lateral views are deceptive.

Posterior dislocation: The femoral head rests above, and posterior to, the acetabulum on the lateral border of the ischium (fig. 9). It is characterized by:

- (1) Inward rotation of the thigh, the stifle and toes pointing towards the elbow and foot of the opposite front limb (fig. 10).

- (2) Adduction of the thigh and limb (fig. 11).

- (3) The limb is shortened on flexion; lengthened on extension.

- (4) Forward rotation of the trochanter. Elevation of the trochanter on the acetabular branch of the ischium. A decided shortening of the space between the trochanter and the tuber ischii.

- (5) The limb is carried in adduction and inward rotation.

- (6) Radiograph is taken with the animal flat on its back.

Two views on one film—extension and flexion.

Intrapelvic dislocation: This injury is probably more frequent than the records show. Radiography is responsible for more accurate diagnoses. In this type of dislocation there is a fracture through the acetabulum from a direct force on the trochanter in line with the direction of the femoral neck towards the acetabulum, pushing the head through or with the fragments into the pelvic cavity. We have observed numbers of partial intrapelvic dislocations, or, more properly, intrapelvic depressions, in acetabular fractures, where the animals did not appear to be at all incapacitated, exhibiting only a moderate lameness and moderate sensitivity to palpation and springing at the hip joint. In true intrapelvic dislocation of the femoral head (figures 12 to 15) the characteristic findings are:

- (1) Abduction of the thigh.

- (2) The limb is shortened in all positions.

- (3) A resistance and limitation to all joint motions.

- (4) Depression of the trochanter, verified by intrapelvic palpation.

- (5) The limb is carried abducted.

- (6) Radiograph. Place the animal flat on its back, spread thighs into abduction, take two views—extension and flexion.

Fracture of the femoral neck: This is a comparatively rare injury, but an important one because of the permanent lameness and deformity that is certain to follow unless a correct diagnosis is made and a proper correction and fixation applied early. Even then there is no assurance of perfect results. A perfect result implies a perfect anatomical reduction, followed by a union

of the fragments in perfect apposition and alignment, and a perfect function of the limb. Therefore, all fractures of the femoral neck, when considered from the standpoint of complete correction and complete functional recovery, are serious injuries. It is our practice to advise our clients of a probable unfavorable outcome before accepting the responsibility of a case.

The clinical appearance of the animal, at first sight, suggests anterior dislocation of the hip. On careful inspection and examination, the typical findings in fracture of the femoral neck are:

- (1) Outward rotation of the thigh, which is more pronounced than in anterior dislocation. When the thigh is forcibly rotated inward and released, it returns into the outward rotation position. (In anterior dislocations, there is resistance to this manipulation.)

- (2) Adduction of the thigh and the limb in the standing position.

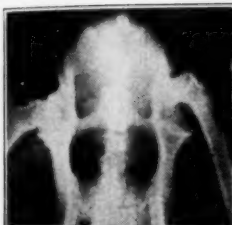
- (3) Pronounced shortening of the limb in all positions.

- (4) A more pronounced elevation and outward rotation of the trochanter. More swelling in the region of the hip, and more pain on palpation.

- (5) The appearance of the limb in the standing position suggests complete loss of power, as though hanging limply to the body. This is a contrast to the fixed appearance in dislocation. All forced motions at the hip are abnormally free on manipulation (in dislocation the positions appear fixed). All motions are conducive to pain. There is no resistance to traction applied and alternated with an upward pressure of the thigh against the hip. Traction and inward rotation of the thigh coordinated with thumb palpation on the trochanter produces a crepitant feel of the contacting fragments.

- (6) Radiography. Two views should be taken (fig. 16). This can be done on one film by shading with a lead plate. The patient is placed on its back with the thighs forward in flexion, and then in the extended position. When only one view is taken, it may show the fragments superimposed, which is misleading.

Detachment of the proximal femoral epiphysis: Where there is a complete detachment of the epiphysis, the injury is in all respects identical to fracture of the femoral neck. It is in reality an intracapsular fracture, and when it is definitely diagnosed, an unfavorable prognosis is given. This is because of the difficulty in obtaining and holding a perfect reduction, the disturbed circulation to the upper fragment, and the uncertainty of healing due to the presence of synovial fluid. It is our practice to advise the



9
Two cases of posterior dislocation. On the left a six month old, on the right one month old before being presented for treatment. The latter case responded to treatment.

10
Posture in the posterior type of dislocation. Note also the atrophy of the thigh.



11
Inward rotation of the thigh in posterior dislocation.

12
Fracture of the acetabulum and intrapelvic displacement of the femoral head.

13
The same case. This view was taken with the thigh extended.



14
Same case eleven days later.

15
An intrapelvic displacement of the femoral head and fragmented fracture of the pelvis.

16
Fracture of the femoral neck. (see also illustration #18, 19, & 40.)

PLATE II
Figures 9 to 16

owner to expect a fairly useful hip function, but that there will be a noticeable shortening of the limb due to a retardation of growth in length at the point of injury (fig. 17). We have observed many cases of quite satisfactory recoveries, but in the majority of cases there was appreciable shortening due to partial resorption of the femoral neck, and a decrease in the angle between the neck and the femoral shaft (coxa-vara). This eventually causes a noticeable tilting of the pelvis toward the injured side, and a noticeable adduction of the limb in motion.

Sprain of the proximal femoral epiphysis: This is a common injury in the very active pups (four to seven months old) and more especially in the Boston terriers and wire-haired fox terriers. Although we believe this injury results from the usual causes of sprains, fractures and dislocations, there have been instances where all pups from the same litter were affected without an accountable cause; a probable predisposition due to faulty nourishment, a disturbed circulation to the epiphysis, or hereditary (fig. 18).

This injury is characterized by lameness and pain in the hip, without evidence of fracture or dislocation. The lameness varies from a mild limp to complete loss of weight-bearing powers. In the average case the limb is carried with all joints in acute flexion. At about every fourth step, an attempt to bear weight upon the limb may be observed, or if the animal is distracted or excited pain is forgotten for the moment and full weight is borne. If carefully observed, a slight limp will be in evidence. On handling, there is resistance to manipulation, especially to abduction and rotation. The most definite evidence is the acute pain elicited on springing the trochanter simultaneously with an inward rotation of the thigh. In the recent sprains, without a slipping or displacement of the epiphysis, there is no shortening of the limb. In cases of two or more weeks standing, there is from a half to one inch shortening, depending on the amount of slipping, resorption and shortening of the femoral neck. Usually the animal is not presented for examination until two or more weeks have elapsed. At this stage the animal will walk with a limp, there is a noticeable atrophy of the gluteal and thigh muscles, a slight tilting of the pelvis toward the affected side, and the limb is carried in adduction and outward rotation. Radiographic films will show partial to extreme slipping of the epiphysis, a decrease in the angle of the femoral neck with the shaft, shortening of the neck, atrophy of the femoral head, and a thickening or building up on the upper border of the femoral neck. In occasional instances the injury is bilateral.

Treatment

REDUCTION IN COXO-FEMORAL DISLOCATIONS

Early reduction is indicated in all cases, and the earlier this is attempted the less the difficulty in reposition. This is most readily accomplished by use of a general anesthetic in order to secure complete muscular relaxation. Exceptions to this are in cases where animals are presented within a few hours after the accident, when in a state of relaxation from the shock, at which time reduction is often possible without an anesthetic; also in cases due to complicating internal or other injuries, where an anesthetic might be harmful, both the anesthetic and the reduction should be postponed until the danger is eliminated. Experience has proven to us that recurrent dislocations are less likely to occur when early reductions are made. An important point in all cases is that the animal be closely guarded against struggling during the stage of recovery from the anesthetic and thereby prevent a recurrence of the dislocation.

ANTERIOR DISLOCATION

The animal is placed on its side with the injured limb (assuming it is the left) uppermost on the table. The manipulations to effect reduction consist of a coördination of traction, abduction, inward rotation and flexion of the thigh, assisted by digital pressure and guidance on the trochanter. The index and middle fingers of the left hand are placed on the trochanter, with the thumb on the inferior border of the acetabulum. With the right hand grasping the limb just below the flexed stifle, to relax the posterior thigh muscles, apply traction with the thigh lifted into moderate abduction against the left thumb at the acetabulum. Continue by moderate flexion and extension motion of the thigh on the hip, gradually working the thigh into inward rotation. The traction is increased gradually until a feel of relaxation is in evidence. At this point the thigh is brought forward into flexion and inward rotation, and definite pressure of the index and middle fingers of the left hand against the thumb, in coördination with the traction, abduction and flexion produced on the thigh by the right hand, will in most instances effect an abrupt and unexpected reposition.

The amount of traction and counter-traction is determined by repeating the manipulations and increasing the effort as the case demands. The average recent anterior dislocation is readily corrected in this manner. If the resistance is too great and if, after several trials it is impossible to effect replacement, we employ an

oversized Thomas splint as an aid in the reduction (fig. 19). The limb is passed through the ring, which is made to rest against the pubis and ischium. The padded end-bar is made to rest against the body of the operator. In this manner both hands are free to apply traction, and the necessary manipulations on the limb, with the greater force (fig. 20). Having the ring resting against the pelvis of the patient and the end-bar against the body of the operator, the traction is applied on the flexed stifle. Lifting the thigh into abduction, continue and increase the traction, apply inward rotation, and perform moderate flexion and extension on the hip until a relaxed feel is experienced. Failing in this, the resistance may be overcome by having an assistant apply a firm downward and forward digital pressure to the trochanter, while the operator repeats the manipulations with an increased effort.

It may be necessary to repeat the manipulations from several to a dozen times in difficult cases, but it is never necessary to employ violent measures. Experience in many hundred reductions has taught us that a coördinated, methodical application of traction, abduction and flexion with inward rotation, reinforced by digital pressure and guidance at the proper moment, effects more reductions successfully and with less harm than more violent means with mechanical traction.

To verify reduction: Successful reduction is proven by:

- (1) Restored length of the limb.
- (2) Restored position of the trochanter.
- (3) Freedom of motion in flexion and extension, abduction and adduction (fig. 21).
- (4) Resistance to redisplacement and to reversed manipulation. Also a resistance to luxation by an outward rotation of the thigh and moderate pressure applied against the medial upper aspect of the thigh.
- (5) A definite resistance and a smooth feel on an upward pressure of the thigh against the pelvis.

After-treatment: Those cases meeting this test usually require no further treatment except close confinement for several days to a week. We advise hospitalization for all cases for at least three days. This is done to enforce confinement and to have the animal at hand should further treatment be indicated.

RECURRENT DISLOCATIONS

Approximately 20 per cent of all coxo-femoral dislocations fall into this group. Recurrent luxation is characterized by the ease of reduction and by an absence of resistance to redisplacement



PLATE III
Figures 17 to 24

on manipulation. The latter is readily effected by an outward rotation of the thigh, when luxation occurs without a feeling of resistance. This is due to extensive rupture of the muscle and tendon attachments in the joint area, in addition to rupture of the capsule and the round ligament.

Fixation: Fixation to prevent recurrence of luxation is necessary in all cases exhibiting the above characteristics. The position of choice, in which the limb is fixed in order to prevent recurrence, is flexion at the hip and knee, moderate abduction and inward rotation of the thigh. Upon holding the limb fixed in this position for ten or more days (depending on the case), redisplacement rarely occurs.

Several methods are available. A practical and effective method is one described by Ehmer.¹ It consists of bandaging the completely flexed limb to the body of the patient, thus bringing the femoral shaft forward into flexion at the hip. Likewise, bandaging may be applied to the body of the patient to produce inward rotation and abduction of the thigh. With a little practice, this is a very effective method. We have found it practical.

Dibbell emphasizes the importance of proper bandaging in the application of a cast. In anterior dislocation, the application of bandage is toward the body, over the front of the leg, making the circular tension of the bandage counteract the tendency of outward rotation. The reverse spiral in posterior dislocation is used to counteract the inward rotation tendency. In the more difficult cases, Dibbell employs bilateral splints with a spreader, the spreader serving to hold the limbs in abduction and thereby holding the head of the femur fixed within the acetabulum. This method is also practical and effective.¹

Our method² has proved to be practical for the majority of our cases to date. It must be remembered that regardless of the method employed, each case may require some individual variation in the fixation, and so forth.

In employing the Thomas splint for fixation of the limb, it is possible, by shaping the splint and by directing the line of traction and in the application of bandage, to fix the limb in the position desired with entire comfort to the animal (fig. 22). The anterior bar of the splint is shaped to form the flexion angle desired for the limb. The limb is fixed within by traction and bandaged toward the forward bar, by placing the bandage around and over the thigh in the inward direction and then over the bar in the same direction, to effect an inward rotation tendency. Adhesive tape is applied to reinforce the bandage and to insure the position.

The limb is now manipulated (fig. 23) to test the stability of the reduction by holding the index finger firmly in contact over the acetabulum and performing flexion and extension, abduction and adduction, and outward rotation of the limb at the hip with the free hand. If reduction is secure, the motions at the hip will impart a normal feeling and the trochanter remains in its normal position during the manipulations. In this event, further fixation is not required. When, on bringing the limb into outward rotation, a tendency to luxation is detected, an abduction rod (fig. 24) is affixed to the splint and to the body of the patient in a manner to produce fixed abduction and inward rotation of the thigh, in addition to holding the thigh in a fixed flexed position. Care is observed in the manner of bandaging and in the employment of traction to avoid tightness at any point (fig. 25). The amount of tension required in the fixation, after a proper reduction has been made, should never be more than the amount necessary to balance or neutralize muscle spasm.

After-treatment: The animal is confined in comfortable quarters for ten to fourteen days. Splintage and dressings are inspected for adjustment for the first few days. Usually, on the second or third day, it will be necessary to snug up on the traction tape to prevent loss of the moderate tension on the limb. Splintage is removed on the tenth day in the majority of cases, and an additional week of confinement is advised.

UNREDUCED DISLOCATIONS

This includes all cases in which the duration of lameness has been one or more weeks before the animal is presented for an examination and treatment (fig. 26). Many cases are presented after one week; quite a number after two weeks; some not until three, or four, or six weeks; and to date there is on record one case presented and successfully treated after a delay of ten weeks.

Reduction: Assuming the anterior type, as the majority are, it is necessary to overcome muscle spasm and shortening, and to break the newly formed adhesions that have formed around the femoral head in its displaced position, before actual replacement is possible. The difficulty in breaking the adhesions and overcoming the muscle shortening is in proportion to the time elapsed since the injury.

Procedure: The animal is anesthetized and placed on its back, the assistant maintaining the position by holding the front limbs at the elbows. The operator begins the manipulations by comparing the range of free motion possible at both hips. There will

be a decided limitation to all motions on the injured side. Manipulations are continued by gradually increasing the range of flexion and extension. This is followed by abduction and adduction, gradually increasing the force against the resistance until freedom of motion is established. Care must be exercised in the application of force in overcoming the resistance (fig. 27). Abrupt force may cause fracture of the femoral neck. (This happened in one of our cases in applying excessive force in attempting to reduce resistance to abduction.) This is followed by rotation and circumduction. Having freed the resistance to these manipulations, the next step is the application of long-axis traction on the limb in the moderately abducted position. This is done with the use of an oversized Thomas splint. Traction is gradually increased and continued and the limb is alternately flexed and extended until a feeling of relaxation is evident. The entire procedure is repeated several times before reduction in anterior dislocation is followed.

Fixation: In order to prevent redisplacement, it is necessary to provide fixation for two to three weeks, and in some instances for four weeks. The corrected position must be maintained to allow time for healing of the capsule and the injured muscles in the joint area (fig. 28).

Although many cases have been successfully treated in the manner described, we have learned that our more difficult cases responded with less difficulty in the handling, and with more comfort to the animal, when skeletal fixation was used. This is now employed in all the recurrent types and in the delayed, unreduced dislocations. The results have been uniformly successful.

The position of flexion and moderate abduction of the thigh at the hip is obtained by direct traction on the femoral shaft by tongs inserted on its lower extremity.^{3, 4} The splint devised for the purpose of providing room for both the limb and the tongs within its boundaries is easily prepared from one piece of soft aluminum rod (figs. 29 and 30). The anterior bar is directed forward and downward, corresponding to the direction desired for the thigh, to about two-thirds of the length of the limb. It is then bent backwards at a right angle for four to six inches, when it is again bent forward at an obtuse angle to a distance equivalent to the length of the flexed normal limb.

That part of the bar between the right angle and the obtuse angle is intended to provide the point for attachment of the tongs, the six-inch range allowing for raising or lowering the line of traction of the tongs on the lower end of the femoral shaft. This is referred to as the traction space. The traction



25

A three & a four weeks old dislocation. Snug and comfortable bandaging, new joint. An instance of indifference.



26

A specimen of an old unreduced anterior dislocation. This dog did not enjoy his new joint. An instance of indifference.



27

Use care in performing the reduction to prevent a possible fracture of the femoral neck.



28

The position of flexion controlled by shaping the splint.



29

Dislocation & fracture reduced. (see #7)



30

Dressing removed to show the tongs and the manner of fixation. Aseptic preparation in application is necessary.



31

The patients do not appear to object to having their limbs immobilized. The splintage is tolerated for weeks if necessary.



31



32

This patient, a rare case, required tongs fixation for eight weeks.

PLATE IV
Figures 25 to 32

originates from the traction space, and the counter-traction is provided by the padded ring resting against the pelvis. The forward bar may be directed forward to approximate a right-angle flexion for the thigh at the hip. This position has been found most comfortable for the animal and it is the position of choice for fixation.

The tongs are secured by an elastic band to the traction space under moderate tension in an amount sufficient to counteract muscle spasm and to hold the weight of the splint snugly against the pelvis. The lower limb is fixed in moderate flexion at the stifle and tarsus and is bandaged evenly between the bars of the lower end of the splint. Fixed in this manner, freedom of motion at the hip is allowed, and the constant fixed tension supplied by the rubber band on the tongs to the thigh prevents rotation of the thigh and counteracts or neutralizes the displacing action of the posterior thigh and the abductor muscles. Over-correction is an indication of excessive tension. This is corrected by releasing the traction.

After-care: The entire thigh and limb is carefully covered with dressing and is then bandaged for comfort to the bars of the splint (fig. 31). The animal is confined. Very little after-care is needed except the usual routine care for surgical cases. The animal is lifted in and out of his cage for the daily exercises for the first week. Splintage is inspected and if the animal appears comfortable, very little adjustment is needed. When properly applied, our cases rarely need change of dressing for the first ten days. The duration of fixation is determined by palpation and manipulation of the hip. If, after ten days of fixation, the hip gives a feeling of resistance and the animal submits to the manipulations without evidence of discomfort, it is quite safe to remove the splintage and dressings. In the majority of cases splintage is not removed before the 14th day; in a few cases not before the 30th day. There need be no fear in leaving the tongs *in situ* for longer periods if properly applied. (One case on our records, a femoral fracture, required fixation for eight weeks and, on removal of the tongs, the wounds were sterile.)

DORSO-LATERAL DISPLACEMENT

Reduction: Apply long-axis traction, abduction, extend, then gradually flex and apply inward rotation.

Fixation: The same procedure is followed as described for anterior dislocation except in the application of traction. More traction is exerted on the traction bands for the first few days

because of the possible detachment of the glenoidal cartilage in this injury. The extra tension is to counteract the upward displacement of the femoral head against the non-resistant proximal border of the acetabulum.

POSTERIOR DISPLACEMENT

Reduction: This is obtained by applying long-axis traction on the thigh with the knee flexed. The traction is applied by first extending and abducting, then bringing the thigh gradually forward into flexion and into outward rotation, assisted by digital pressure and manipulation on the trochanter.

Fixation: Follow the same procedure as in anterior dislocation except in the bandaging of the thigh. This is applied outward from within.

PROGNOSIS

The prognosis in all dislocations of the hip is dependent upon the reduction and its maintenance. In those cases where a reduction has been obtained and where there is no indication of recurrence to reversed manipulation, complete recovery (fig. 33) may be expected in at least 90 per cent of the cases; the remaining 10 per cent may recur. Therefore, it is our policy to advise hospitalization in all cases for at least three days. This makes it possible to detect a recurrence and apply the necessary treatment. Prognosis in the recurrent and the delayed, untreated cases likewise depends upon a successful reduction and fixation. Where reduction is maintained by fixation for two or three weeks, without indication of a recurrence, a complete recovery may be expected (fig. 34). In the longer standing cases, where treatment has been delayed for a month or more, we feel justified in withholding a favorable prognosis until definitely satisfied that a reduction has been successfully maintained for at least two weeks.

TREATMENT FOR FRACTURE OF THE FEMORAL NECK AND DETACHMENT OF THE PROXIMAL FEMORAL EPIPHYSIS

Reduction: The upward displacement of the shaft caused by the combined pull of the gluteal, ilio psoas, adductors and the posterior thigh muscles must be corrected by traction. The outward rotation of the thigh caused by the ilio psoas is corrected by inward rotation.

Our first step after a diagnosis has been made is to prepare a splint. It is shaped to fit so that the limb may be comfortably fixed (within it) in moderate flexion at the hip and the stifle, al-

lowing sufficient extra length (one to one and one-half inches) for take-up on the traction from day to day.

The manipulations are about as follows: The limb is passed through the splint, the ring is pushed up and against the pelvis, and the end-bar is made to rest against the body of the operator, thus leaving both hands free to apply traction and the necessary manipulations. Traction is applied on the thigh with the knee flexed, gradually rotating the thigh inward and moving it forward into flexion at the hip. Release momentarily on the traction for a test of a possible engagement of the fragments. Contact is probable if the upward displacement does not recur on the release of the traction, and if a mild crepitant feeling is imparted to the hands at this instant. The thigh is now abducted and an upward pressure is applied. If this meets with definite resistance, a reduction is probable.

Fixation: The limb is immediately fixed in the position of semi-flexion, at the hip and the stifle, under sufficient tension to hold the reduction and to counteract muscle pull (figs. 35 and 36). An abduction rod is then applied to fix the limb in moderate abduction to the body of the patient.

Skeletal fixation: For simplicity, practicability and comfort for the animal, we prefer this method. The procedure in the application is identical to that described for fixation in anterior dislocation of the hip. With it the positions are maintained with a minimum amount of traction, and with perfect comfort for the animal.

Duration of fixation: This is usually three to four weeks, followed by an additional week of confinement after the discontinuance of splintage.

Prognosis: A functional limb may be expected in the majority of cases. This does not apply to the case of an aged animal. Shortening, a noticeable tilting of the pelvis toward the affected side, and adduction of the limb may be expected. An occasional approach to perfect end results is also possible (figs. 37 to 40).

TREATMENT FOR SPRAIN OF THE PROXIMAL EPIPHYSIS

When the animal is presented within a few days after the accident, or after the first sign of lameness is noted, the treatment consists mainly of enforced rest for the affected limb. This is obtained by placing the limb within a Thomas splint, and fixing it in moderate flexion at the hip and stifle. The animal is confined in comfortable small quarters for a week or more. In those cases presented after delays of two or more weeks, and where abnormal changes are noticeable, an unfavorable prognosis is

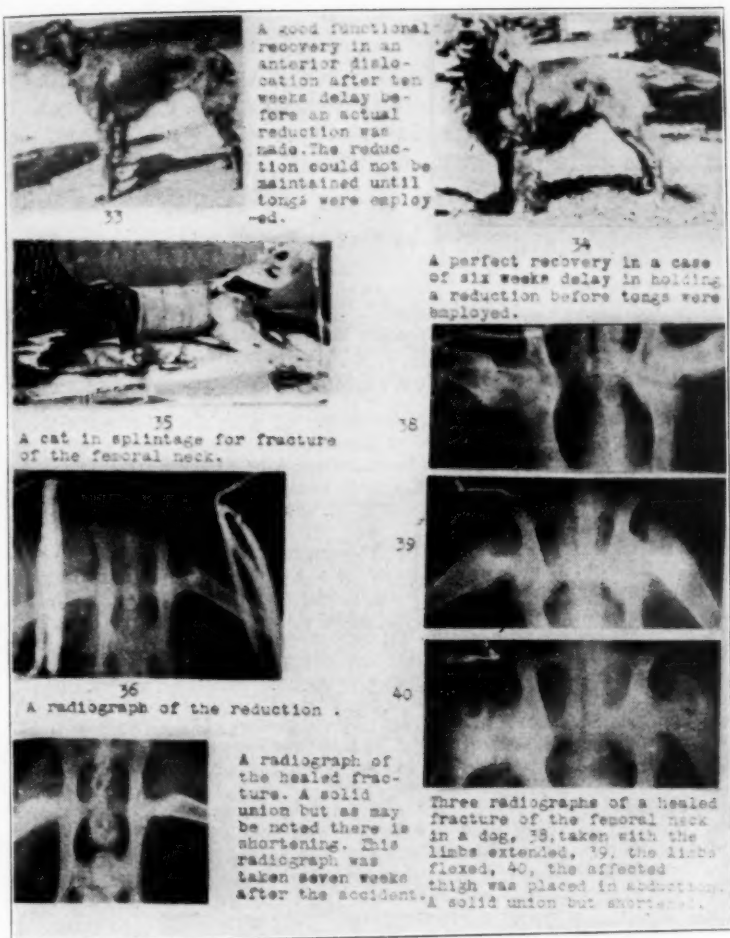


PLATE V
Figures 33 to 40

given. However, good results may be expected in many cases by resorting to the above fixation and confinement. The splintage is applied in the same manner except that there is an increase in the traction to overcome gradually the existing displacement or shortening; also an attempt to effect inward rotation of the thigh in the application of bandage. The tension is taken up as needed and the bandage is inspected for snugness. Further injury is prevented and part of the existing deformity may be corrected in this manner. Splintage is maintained for two or more weeks. An additional week of confinement after the removal of the splintage is an important part of the treatment.

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²Schroeder, E. F.: The traction principle in treating fractures and dislocations in the dog and cat. No. Amer. Vet., xiv (1933), 2, pp. 32-36.
³Schroeder, E. F.: Fractures of the femoral shaft of dogs. No. Amer. Vet., xiv (1933), 12, pp. 38-46.
⁴Schroeder, E. F.: The use of traction in the treatment of fractures. Corn. Vet., xxv (1935), 2, pp. 111-131.

DISCUSSION

DR. F. E. McCLELLAND: The discussion of a subject infers more or less that differences of opinion, judgment and experiences occur. But a classic thesis, based on absolute knowledge of anatomy and practical experience such as we have just heard, excludes differential discussion or criticism of any kind. We have just been treated to a masterpiece dealing with a difficult subject.

Some of us consider too lightly these cases when presented by our clients. There is now no excuse for this with our present knowledge.

Under the classification of multiple injuries, or often as a distinct unit injury, I have experienced a paralysis of the sciatic or perineal nerve causing a dropping of the stifle and curling under and dragging of the toes. This, however, is not so common as radial paralysis in the front leg. Nor is it so permanent or resistant to treatment.

Injuries to the glenoidal cartilage, even though the dislocation is properly reduced, occasionally result in exostoses and roughening of the inner surface edge of the rim. This, of course, mechanically lessens full action and causes discomfort for a period of several weeks, but usually corrects itself in time. Most of us have seen in old, untreated cases of dislocation a so-called "new joint" formed by the head of the femur creating a fossa on the edge of the acetabulum, with enough movement to allow the animal to walk almost without limping.

Dr. Schroeder has given considerable time to describing macroscopic and manual examination and manipulation to determine the nature and the extent of the various hip injuries. Nor should the examination per rectum ever be overlooked. Experience alone must be the operator's guide in this work. I believe I am personally more grateful for the knowledge gained by the use of the X-ray in this particular field than for any other one thing. Its coöperation with manual examination soon makes its use less necessary.

In this connection may I emphasize Dr. Schroeder's warning that intelligent reading of radiographs of all dislocations and most fractures depends on the position of the patient and the affected part when the graph is taken. We often find it advantageous to use the fluoroscope and produce motion at the seat of injury before the shadows and lights in the graph are properly visualized and understood.

There frequently occurs a hip injury which I think Dr. Schroeder omitted intentionally, because it does not directly involve the bony structure of the pelvis. I refer to strains of the muscles of the hip, along the back of the thigh and the femur. The same predisposition, creating a leverage on the coxo-femoral joint, makes possible at times an unbalanced muscular strain, resulting in serious and prolonged lameness. This is decidedly annoying, particularly in show dogs. Our treatment has been to inject intramuscularly a few drops of Lugol's solution and glycerin (1 to 3) at various places around the coxo-femoral joint and into the thigh muscles. By repeating this treatment two or three times, about seven days apart, much benefit will result, especially if atrophy of disuse has taken place.

Some time ago, our attention was called to the theory that perhaps the reason some of the dislocation replacements were not permanent was because folds of the surrounding soft or connective tissues were pinched between the articulations. But I am now of the opinion that this is not so and I strongly endorse Dr. Schroeder's statement that violent measures in manipulating replacements are not only harmful but unnecessary, even in delayed reductions.

It is extremely interesting to note that Dr. Schroeder has successfully accomplished permanent cures in cases of delayed reductions of even more than a month or six weeks duration. I admit I have not been able to produce improvement in these cases sufficient to advise it as a practical procedure.

Again may I say that no one can add or detract anything of importance in connection with a paper so well thought out and written as this one by Dr. Schroeder. It has been of great benefit to those of us privileged to listen to it.

Dr. Schwartz to Editorial Committee

Dr. Benjamin Schwartz, chief of the Zoölogical Division, U. S. Bureau of Animal Industry, has been selected to serve on the editorial committee of the *Journal of Agricultural Research*, replacing Dr. F. L. Campbell, entomologist, who recently resigned from the service of the U. S. Department of Agriculture to engage in scientific work at Ohio State University. The appointment of Dr. Schwartz was made by Secretary of Agriculture Wallace.

Dean Wegner Visiting European Veterinary Colleges

Immediately after the A. V. M. A. convention in Columbus in August, Dean and Mrs. E. E. Wegner, of Pullman, Wash., sailed for Europe. They planned to spend two or three months in western Europe, where Dean Wegner will make a study of veterinary colleges and veterinary educational methods. It was planned to visit the more important veterinary institutions in the British Isles, Denmark, Germany, Austria, Hungary, Italy, Switzerland and France.

THE CENTER OF POPULATION OF VETERINARY MEDICAL EDUCATION, 1890-1930*

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The *center of population* is defined by the United States Census Bureau as "the point upon which the United States would balance if it were a rigid plane without weight, and the population distributed thereon, each individual being assumed to have equal weight and to exert an influence on the central point proportional to his distance from the point." In other words, it is the center of gravity of the weighted plane or a two-dimensional average of the population.

The determination of this point at the regular decennial census intervals is the best method that has been devised by the Census Bureau to trace compactly the rate and direction of general movements of the population. The first official computation of this point was made under the direction of Francis A. Walker, superintendent of the ninth census, for publication in the first statistical atlas of the United States published in 1874.¹ At that time the position of the center of population was computed for each census year since 1790. An unofficial computation covering an earlier period and other information regarding the history of the center of population were published in 1925.²

So convinced has the Census Bureau become of the value of this mode of summarizing population trends that in later years it has made much more extensive use of the same method. In 1910, the positions of the center of population since 1880 for each state were computed. In 1920, the method was further extended to include centers of foreign-born population, of Negro population, of urban and rural population, and even to determine centers of agriculture, of manufacturing, of number of farms, of farm area, of improved acreage, of value of farm property, and of the production of corn, wheat, oats and cotton.³

Why not then educational centers of population as well? A method which has proved so valuable in summarizing movements of general population should be equally valuable in studying the movements of the higher educational population—the student enrollment in the colleges, universities and professional schools of the United States.^{4, 5} The object of this paper is to report and discuss the results of computations which have been made by the

*Received for publication, August 16, 1935.

author to determine the center of population of veterinary medical education for each census year from 1890 to 1930.

METHOD OF COMPUTATION

The data upon which the computations are based were taken from the official reports of the United States Office (formerly Bureau) of Education.^{6, 7} These statistics are not perfect, but they probably are as accurate and reliable as are available. The method used was the same as that of the Census Bureau, with the substitution of "states" (with their centers of population as computed by the Census Bureau) for "square degrees" as the unit of computation.* The number of students of veterinary medicine involved for each census year is as follows:

1890	463
1900	362
1910	2,717
1920	908
1930	882

In spite of relatively large fluctuation in actual number of students reported as studying veterinary medicine at the different census years, the center of population shows a surprisingly steady progress as will appear in the next paragraph.

LOCATION OF CENTERS

The latitude and longitude and approximate location of the center of veterinary medical education for the five different decennial periods since 1890 are shown in table I and on the map of figure 1. The map also shows the location of the general center of population of the country for the same dates.

The most outstanding fact shown is the exceedingly rapid shift westward of the center of population for veterinary medicine—a total of almost 700 miles in only 40 years. This movement has carried it from a point in western Pennsylvania, clear across the three states of Ohio, Indiana and Illinois, into the northeast corner of Missouri. It has moved westward by varying distances from a maximum of 273 miles to a minimum of 71 miles. The

*In the "Statistical Atlas of the United States, Based on the Results of the Ninth Census," Francis A. Walker, compiler, says: "In making the computations for the location of the center of population it is necessary to assume that the center is at a certain point. Through this point a parallel and a meridian are drawn, crossing the entire country. . . . The product of the population of a given area by its distance from the assumed parallel is called a north or south moment, and the product of the population of the area by its distance from the assumed meridian is called an east or west moment. In calculating north and south moments the distances are measured in minutes of arc; in calculating east and west moments it is necessary to use miles on account of the unequal length of the degrees and minutes in different latitudes. The population of the country is grouped by square degrees—this is, by areas included between consecutive parallels and meridians—as they are convenient units with which to work."

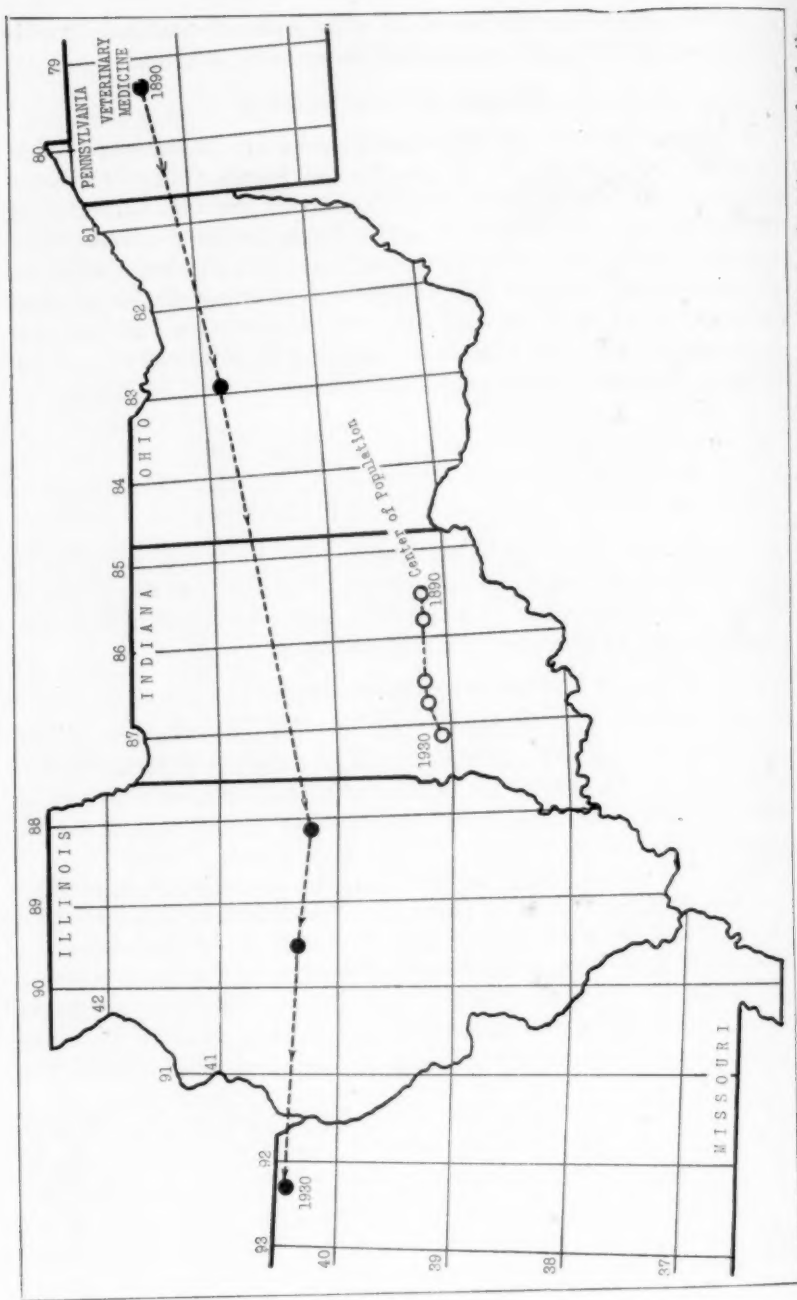


FIG. 1. Map showing location and movement of the centers of population of veterinary medical education and of the general population, 1890-1930.

general trend was markedly southward in the first two decades, a total of 69 miles, but during the past two decades this trend has been reversed, with a slight northward movement of 16 miles in 20 years. The movement of the center of veterinary medical education in miles each decade is summarized in table II.

TABLE I—*Location of centers of population of veterinary medical education, 1890-1930.*

YEAR	LATI- TUDE NORTH	LONGI- TUDE WEST	STATE	COUNTY	DISTANCE FROM IMPORTANT CITIES AND TOWNS
1890	41° 21'	79° 22'	Pennsylvania	Clarion	70 miles NE. of Pitts- burgh; 9 miles N. of Clarion, C. S.
1900	40° 51'	82° 57'	Ohio	Crawford	38 miles N. of Dela- ware; 3 miles NE. of Bucyrus, C. S.
1910	40° 11'	88° 08'	Illinois	Champaign	7 miles NE. of Cham- paign; 5 miles NE. of Urbana, C. S.
1920	40° 20'	89° 29'	Illinois	McLean	34 miles NE. of Cham- paign; 27 miles NE. of Bloomington, C. S.
1930	40° 27'	92° 21'	Missouri	Scotland	48 miles W. of Keokuk, Iowa; 9 miles W. of Memphis, C. S.

C. S. = County seat.

Reference to the map in figure 1 shows that the center of population of veterinary medical education which, in 1890, was 328 miles east of the general center of population for the same year, in 1930 was 277 miles west of the general center in the same year. While the center of population shifted westward only 85 miles in four decades, the veterinary center jumped 682 miles, over eight times as far. Westward the Course of Empire has taken its way, but far more rapidly for students of veterinary medicine than for the general population. The north and south distance between the two centers, which was 80 miles in 1890, has increased to 96 miles in 1930. Relative to the distribution of the general population, there is now a much greater emphasis on veterinary medicine in the West and the North than in the East and the South. The East has lost much of its earlier primacy in the field of veterinary medical education.

By 1940, the veterinary medical center bids fair to be located somewhere still further westward, in Missouri or Iowa, while the general center of population will probably scarcely reach the

eastern Illinois line. Such facts as these may furnish food for thought and speculation on the part of those responsible for the education of the veterinarians of the future.

TABLE II—*Movement of center of population of veterinary education, 1890-1930, in miles during the preceding decade.*

YEAR	FROM POINT TO POINT IN A STRAIGHT LINE	NORTHWARD	SOUTHWARD	EASTWARD	WESTWARD
1900	189.7	—	29.9	—	187.3
1910	275.9	—	39.5	—	273.1
1920	71.6	8.8	—	—	71.1
1930	151.2	6.9	—	—	151.0
Totals (Net)			53.7		682.5

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(*Editor's note:* There is one factor which Dr. Eells apparently has not taken into consideration with reference to the westward shift of the center of population of veterinary medical education, and that is the closing of nine private veterinary colleges during the 1910-1920 decade. With two exceptions, these institutions were located in or east of Missouri. Three more closed during the 1920-1930 decade, all in or east of Missouri, to which state the center of population of veterinary medical education had shifted by 1930. Another factor, which may have its effect on Dr. Eells' prediction for 1940, is to be found in the limitations placed on the enrollment of veterinary students in some of our colleges, particularly those in the East. This has had the effect of shifting the overflow westward and southward to those colleges not restricting the enrollment of veterinary students.)

Bureau Transfers

DR. EDWARD HIMSEL (Cin. '13), from Chicago, Ill., to Cleveland, Ohio, in charge of meat inspection.

DR. F. S. GRAZIADEI (Corn. '29), from Chicago, Ill., to Lyndhurst, N. J., on meat inspection.

DR. E. HEINY (Ind. '08), from Rocky Ford, Colo., to Denver, as supervisor of the Denver Union Stock Yards.

SUSCEPTIBILITY OF CHICKENS TO TUBERCULOSIS FOLLOWING SPONTANEOUS EXPOSURE TO THE INFECTION*

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The natural history of any infectious disease is probably the most difficult phase of the process to understand. This is particularly true of a disease of more or less chronicity, such as tuberculosis, in which the inception is insidious and the progress extremely variable. This aspect of the problem of avian tuberculosis has received but little attention from investigators, although certain phases of the problem have been studied in America by Van Es and Olney,¹ and by Schalk, Roderick, Faust and Harshfield,² and in Europe by Lichtenstern,³ by Beller and Hemminger,⁴ and by Bornstedt and Röhrer.⁵

The object of the experimental observations which constitute the basis of this report was to obtain information on the susceptibility of adult chickens to tuberculosis on natural exposure through cohabitation with infected fowls. We also hoped to learn something concerning the time necessary for the disease to become established in chickens when the opportunity for continuous contact with the infection existed.

METHODS

In order to secure chickens presumably affected with spontaneous tuberculosis, arrangements were made to purchase the chickens from two flocks in which the tuberculin test had disclosed a rather high incidence of the disease. Eleven adult hens were obtained from one farm and 19 adult hens from another. Each of these 30 chickens had previously reacted positively to intracutaneous injection of avian tuberculin, and they were purchased within a few days after the results of the tuberculin test had been recorded.† All 30 were of the Barred Rock breed and, while a few were in poor physical condition, the majority were fairly well fleshed and presented no objective symptoms of disease.

In addition to these presumably tuberculous chickens just mentioned, 29 apparently normal hens, which had failed to give a positive reaction to the tuberculin test, were secured from flocks

*Received for publication, April 25, 1936.

†Tuberculin tests were done by Dr. S. H. Burgess, Bureau of Animal Industry, U. S. Department of Agriculture.

in which tuberculosis was not known to occur. Ten of them were of the Barred Rock breed and 19 were of the White Leghorn breed. All chickens were approximately 18 months of age when obtained for the experiment.

These two groups of chickens were placed together and housed in a barn more or less isolated from the other laboratory buildings where they were cared for by the same attendant throughout the period of the experiment. The room in which the birds were kept was chosen because of its unhygienic aspects, since it was the desire to provide optimal conditions for a spread of the disease from the tuberculous to the non-tuberculous chickens. This room, which measured 20 by 30 feet, had only two windows and the interior received very little direct sunlight. The floor was of dirt and the interior was not cleaned during the course of the experiment. As part of another experiment, two calves were placed in the same room with the chickens; one remained for 518 days, and the other was kept in the enclosure until the last of the chickens had been removed (601 days). This room in which the chickens were kept eventually became extremely filthy, and since no special means for ventilation were provided, the moisture content of the floor was rather high at all times. A roost was provided for the chickens and drinking water was supplied in the same trough from which the calves drank. The chickens received a maintenance ration of grain which they picked off the floor.

Birds that died and those that were killed were necropsied and the presence or absence of gross lesions of tuberculosis was noted and, in addition, tissues were preserved for microscopic study from the following: brain, lung, trachea, liver, spleen, pancreas, kidney, ovary, intestine and bone-marrow.

Tuberculin tests: Three weeks after the experiment began, all of the chickens were subjected to the intradermal tuberculin test, and this was repeated at irregular intervals throughout the period of observation. The tuberculin used for the first four tests was obtained from a commercial biological supply concern, while that used for the balance of the tests was obtained from the Bureau of Animal Industry of the United States Department of Agriculture. The usual procedure was followed in making the tuberculin tests. The tuberculin was injected intradermally into the skin of one wattle and the results were recorded after the lapse of 48 hours.

SPLENECTOMIZED CHICKENS

It was thought desirable to demonstrate the presence of lesions of tuberculosis in chickens which had reacted positively to the

tuberculin test, so that there would be no doubt as to the duration of the exposure of the non-infected birds. Accordingly, 18 of the 30 chickens which were purchased after having given a positive reaction to tuberculin were placed under general anesthesia and all or nearly all of the spleen was removed. While the abdomen was open the presence or absence of lesions of tuberculosis in the liver and intestines was noted. The splenic tissue which was removed was divided into two portions, one portion being emulsified in an attempt to isolate tubercle bacilli by culture methods, the other portion being used for the making of histologic sections. By these means we hoped to determine the actual presence of the disease and to compare the extent of the disease at the time of splenectomy with the conditions observed later at necropsy. Splenectomy was performed within a few days after the chickens were purchased, and, after they had recovered from the effects of operation, these chickens were added to the rest of the flock used in this study.

RESULTS

Of the 30 chickens that had reacted positively to a clinical diagnostic dose of tuberculin before they were secured for the experiment, lesions of tuberculosis were demonstrated in 18, whereas in the remaining twelve there was neither gross nor microscopic evidence of the disease (table I). In one of these twelve cases, however, while lesions of tuberculosis were not demonstrable, culture of a specimen of spleen 156 days prior to the death of the chicken was positive for tubercle bacilli. Ten of the diseased birds had died during the first 100 days of the experiment. Of the other nine which lived for more than 100 days, four lived more than 200 days, two more than 400 days and one survived more than 500 days.

Since elimination of tubercle bacilli from the tuberculous chicken is, in the majority of instances, by way of the intestinal tract, it is of interest to note that tuberculous lesions were present in the intestines of eight of the hens. There is also evidence that the infective bacteria may be eliminated with the bile of infected livers,^{2, 6} which organ was involved in eleven of the 18 birds which had tuberculosis.

Of the 29 apparently normal hens which were subjected to contact exposure by cohabitation with the tuberculous fowls, only seven (24 per cent) had lesions of tuberculosis at the time of necropsy. The period of exposure of the respective birds in this group varied considerably. Six of them died before the lapse of 100 days. Twenty-three lived more than 100 days, 22 lived more

TABLE I—*Chickens presumably infected with tuberculosis when experiment began.*

BIRD	DAYS OF OBSERVATION	TUBERCULIN TESTS		FINDINGS AT NECROPSY
		POSITIVE	NEGATIVE	
1	195	3		No lesions
2	435	4	4	Tuberculosis
3	544		9	No lesions
4	86	1	1	Tuberculosis
5	13	Not tested		Tuberculosis
6	262	3	3	Tuberculosis
7	494		8	No lesions
8	524	2	5	Tuberculosis
9	601	5	5	No lesions
10	56	1		Tuberculosis
11	142	2	1	Tuberculosis
12	72	1		Tuberculosis
13	160	2		No lesions*
14	231	2		Tuberculosis
15	238	2		No lesions
16	7	Not tested		Tuberculosis
17	111	1		Tuberculosis
18	7	Not tested		No lesions
19	7	Not tested		Tuberculosis
20	68		1	Tuberculosis
21	416	4		No lesions
22	84	1		Tuberculosis
23	58	1		No lesions
24	402	3	2	No lesions
25	15	Not tested		No lesions
26	300	3		Tuberculosis
27	402	2	2	No lesions
28	286	3		Tuberculosis
29	410	2	3	Tuberculosis
30	60	1		Tuberculosis

*Culture of a specimen of spleen 156 days prior to death was positive for tubercle bacilli.

than 200 days, 21 lived more than 400 days and 18 lived more than 500 days. The data pertaining to the seven tuberculous chickens are summarized in table II.

TABLE II—*Chickens found to be tuberculous after prolonged periods of natural exposure to the infection.*

BIRD	DAYS OF EXPOSURE	TUBERCULIN TESTS		SITUATION OF LESIONS
		POSITIVE	NEGATIVE	
1	531 (Killed)	None	10	Liver and intestines
2	564 (Died)	None	9	Liver, intestines, spleen, kidney, bone-marrow
3	518 (Died)	None	9	Liver, spleen, lung, intestine
4	589 (Killed)	None	10	Spleen, intestine, lung
5	589 (Killed)	2*	8	Spleen, liver, intestine
6	590 (Killed)	None	10	Spleen, liver, intestine
7	586 (Killed)	None	10	Intestine, spleen, liver, bone-marrow

*The first positive tuberculin reaction occurred after this chicken had been exposed to infection for 518 days; the second positive test was recorded 65 days later.

Of the 29 chickens which were exposed to infection, positive tuberculin tests were recorded for only one bird and this one had extensive lesions of the disease at necropsy. With few exceptions all of these chickens were tested repeatedly and with the one exception noted none showed sensitivity to tuberculin.

It was of interest to note the comparative incidence of the disease in the two breeds of chickens exposed to the infection. Of the 19 White Leghorns demonstrable tuberculosis developed in only one, whereas the disease developed in six of the ten Barred Rocks.

Of the 18 birds whose spleens were removed, four died apparently as a direct result of the operation. The majority of the others lived from 150 to 410 days. During the period of observation, eleven of the birds died; the remaining seven were killed at the completion of the experiment. At the time of splenectomy lesions of tuberculosis were observed in five of these chickens, although cultures of tubercle bacilli were isolated from the splenic tissues of eight (table III). Four of the eight spleens which yielded tubercle bacilli in culture failed to contain discernible lesions of tuberculosis either grossly or microscopically.

TABLE III—Extent of tuberculosis observed in 18 chickens at splenectomy and at necropsy.

BIRD	SPLENECTOMY			AT NECROPSY, LESIONS IN:	SURVIVAL (DAYS)
	GROSS LESIONS	MICROSCOPIC FINDINGS IN SPLEEN	CULTURE OF SPLENIC TISSUE		
12	Spleen	Tuberculosis	+	Bone-marrow	66* (Died)
13	None	Normal	+	None	156 (Died)
14	None	Normal	+	Lung, liver, intestine, bone-marrow	237 (Killed)
15	None	Normal	+	None	234 (Killed)
16	Spleen	Tuberculosis	+	Spleen	Died at once†
17	None	Normal	+	Liver	105 (Killed)
18	None	Normal	+	None	Died at once
19	Liver	Normal	+	Liver	Died at once
20	Liver	Tuberculosis	+	Liver and lung	61 (Died)
21	None	Normal	—	Intestine	410 (Killed)
23	None	Normal	—	None	53*
24	None	Normal	—	None	397 (Killed)
25	None	Normal	—	None	1 (Died)
26	None	Normal	—	Intestine, liver, bone-marrow	287 (Died)
27	None	Tuberculosis†	—	None	389 (Killed)
28	None	Normal	—	Lungs, liver, intestine, bone-marrow	273 (Died)
29	None	Normal	—	Intestine	397 (Killed)
30	Spleen	Tuberculosis	+	Liver	47 (Died)

*Accidental death.

†Histologic appearance of tissue that of tuberculosis but acid-fast bacilli not observed in section.

‡Died at splenectomy.

Note: 1. Plus or minus symbols indicate whether tubercle bacilli were obtained.
2. For results of tuberculin tests of the chickens listed above, see table I.

In only one instance was infection demonstrated to be present at the time of splenectomy and was apparently absent when the chicken died 156 days later. In the case of this chicken, tubercle bacilli were obtained in culture from a portion of the splenic tissue, although other portions failed to reveal tuberculous lesions in sections examined microscopically.

COMMENT

These observations confirm the general opinion that tuberculosis in chickens, when acquired by natural means, is usually a disease of considerable chronicity. The majority of adult hens seem to withstand more or less continuous exposure over a long period of time without demonstrable evidence of the disease developing. However, it is reasonable to presume that had the exposure continued indefinitely until all of the chickens had died from natural causes, the disease eventually would have become manifest in many additional birds.

Our results are comparable to those of Van Es and Olney, who studied the influence of sanitary and insanitary environments on the acquirement of tuberculosis by adult chickens and found a very low incidence of transmission. However, when young fowls were exposed to the infection in a comparable manner, the incidence of the disease was considerably higher. The results of Van Es and Olney¹ seemed to them to indicate that, "after a fowl attains the age of two years or more without previously contracting tuberculosis the chances of it doing so when placed in an infected environment are fairly remote." That the age of the chicken rather than an insanitary environment is the most important factor in the transmission of tuberculosis was the opinion of Van Es and Olney. The tenacity of the tubercle bacillus and its capacity for longevity outside the tissues of the body seemed to Van Es and Olney to offset any advantages that might ordinarily be expected to accrue from efforts at sanitation.

Indicative also of the time necessary for the disease to become manifest by natural exposure of chickens to it are the results of the work of Schalk and others. These investigators found that of 98 chickens, which varied in age from six to ten weeks and which had been confined for from four to five months in an infected environment, only ten showed lesions of tuberculosis at necropsy.

Over a six-year period, Matheson⁷ studied the epizootology of avian tuberculosis in six groups of young chickens obtained from widely separated districts of England and Scotland. He found

the death rate from tuberculosis during the period of a year to be 0.66 per cent. Each group was under observation from October until the following September, when a new group of birds was secured. During the six-year period, a total of 3,306 chickens were studied and tuberculosis was considered as the cause of 9.56 per cent of all deaths. The presence of the disease was determined by necropsy; the tuberculin test was not made. Matheson concluded that the disease was not contracted from the environment in which the chickens lived during the period of observation but was present in the birds previously.

Beller and Hemminger⁴ quoted the work of Weber and Bofinger,⁸ Röbiger,⁹ and Eber,¹⁰ as indicating the considerable degree of resistance of chickens to large single doses of avian tubercle bacilli placed experimentally into the alimentary tract.

In their own work, Beller and Hemminger⁴ gave each of eight adult hens, by way of the alimentary canal, 15 or 30 mg of virulent tubercle bacilli; after four months all birds were examined at necropsy. Tuberculous infection was demonstrated in only one chicken, and this one had failed to react positively to tuberculin administered several times prior to death. Two chickens in the series which failed to show the infection at necropsy had reacted positively to tuberculin. In another experiment in which chickens of different age groups were utilized, avian tubercle bacilli in doses of 5 mg were introduced into the alimentary tract at intervals of two weeks for an indefinite period. When these chickens were killed, approximately four months after the beginning of the experiment, lesions of tuberculosis were visible in only three. Twelve normal birds were permitted to cohabitate with the six that had received the infective bacteria experimentally and, during the four-month period of observation, only two reacted positively to the tuberculin test. While lesions of tuberculosis were not found in any of the birds, a culture of tubercle bacilli was obtained from the tissues of one. Although this bird gave four negative tuberculin reactions, one positive reaction was obtained near the end of the experimental period.

Beller and Hemminger mentioned that the time of exposure by contact was not adequate for maximal results, and they concluded that infection of chickens by way of the alimentary tract regardless of the age of the bird, requires a large amount of the infective material and repeated exposure.

Bornstedt and Röhrer,⁵ in experiments designed to determine the transmission of avian tuberculosis from spontaneously in-

fected chickens to healthy ones by natural exposure, concluded that six to twelve months are required for the disease to become evident under these conditions.

Since but few of the birds in our experiment died as a direct result of tuberculosis, we obtained no data on the seasonal incidence of the disease. Lichtenstern³ was of the opinion that the disease is most prevalent during the spring and summer, owing to the lowered resistance of the birds during the period of greatest egg production and a larger opportunity for ingestion of the bacteria as a consequence of an enhanced appetite. While it may be true that a greater susceptibility exists during the time of greatest egg production, the chronic character of the disease and the variability of its duration before it results in death makes this aspect of the problem difficult to understand. Insofar as we are aware, eggs were not laid by any of our birds, so this factor need not be considered.

No data were obtained from the findings at necropsy that would indicate the entry of the infective agents by any other route than the digestive tract. Lichtenstern believed the rooster to be an important factor in the transmission of the disease during coitus, and that removal of the rooster from a flock would influence the spread of infection. Since tuberculous lesions are not uncommonly present in the mucosa of the cloaca, this means of transmission probably occurs. However, since no male birds were included in our experiment, contagion by this manner could not have occurred.

Although lesions of tuberculosis were not found in several of the chickens which had reacted positively to tuberculin before the experiment began, this does not impugn the reliability of the test as a means of separating tuberculous from non-tuberculous chickens. It must be recognized that the demonstration of lesions of tuberculosis is not always a simple task. Frequently, tissues devoid of lesions of macroscopic dimensions contain definite and numerous microscopic lesions, and cultures of tubercle bacilli can sometimes be secured from the spleen although the organ is without gross or microscopic evidence of their presence.* As an example we refer to four chickens in the series that were splenectomized (13, 14, 17 and 19, table III). The spleen of each of these birds was without gross lesions and microscopic

*Fitch, Lubbehusen and Dikmans⁶ recorded an instance where a chicken consistently gave a positive reaction to the tuberculin and laid eggs containing tubercle bacilli yet lesions of tuberculosis could not be found at necropsy. Similar instances of chickens reacting positively to tuberculin but in which tuberculosis could not be found at necropsy are reported by Beller and Hemminger⁴ and by Bornstedt and Röhrer.⁵

lesions were not found, yet when portions of the respective spleens were utilized for making cultures, tubercle bacilli were obtained from each.

Unfortunately we did not culture tissues from the chickens which had reacted positively to the tuberculin test and in which no lesions of tuberculosis were found. To have done so would have perhaps demonstrated the presence of the infective agent in a higher percentage of the chickens.

The impossibility of examining minutely every tissue in an animal's body where tubercle bacilli may occur is of course obvious, yet unless this can be accomplished, one is not justified in claiming that failure to find lesions of tuberculosis indicates a non-specific or false reaction on the part of the tuberculin which elicited the local tissue response.

The failure of tuberculin to provoke a positive reaction in six of the seven chickens which apparently contracted the disease during the course of the experiment may perhaps be accounted for by the excessive and repeated infection which was followed by an extensive progression of the disease. The tuberculin sensitivity of such an animal is frequently so depleted as to preclude a local tissue response such as characterizes a positive intradermal tuberculin reaction.

There is no reason to believe that the course of the disease was influenced favorably as a consequence of splenectomy. In some instances it appeared that removal of the spleen was indirectly detrimental to the welfare of the chicken, in that lesions occasionally were unavoidably ruptured and the infective material was disseminated within the peritoneal cavity. Certain diffusely scattered lesions which occurred in the serosa over the proventriculus and gizzard, and in the area where the spleen had previously been attached, indicated such an inception.

SUMMARY AND CONCLUSIONS

For the purpose of obtaining information concerning the susceptibility of apparently normal adult chickens to tuberculosis as a consequence of cohabitation with chickens spontaneously affected with the disease, a group of 29 non-tuberculous chickens were kept in contact with 30 chickens which had reacted positively to the tuberculin test. The experiment continued for nearly 600 days, and only seven of the previously non-infected birds contracted the disease although tuberculosis was found in 19 of the 30 chickens that were presumably tuberculous when the experiment began.

The results indicate that, under the conditions of the experiment, the majority of the chickens were capable of withstanding an environmental exposure to tuberculosis for a considerable period without lesions of the disease developing. Repeated or continuous exposure for a prolonged period appears to be necessary before the disease becomes manifest in adult chickens living in an infected environment.

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Leaflet on Lungworms of Swine

Leaflet 118, containing concise information on methods of controlling lungworms in swine, has just been issued by the U. S. Department of Agriculture. Dr. Benjamin Schwartz, chief of the Zoölogical Division of the Bureau of Animal Industry, is author of the leaflet. It also describes the parasite, its effect on the host, and how pigs become infested. Grown pigs are shown to be more susceptible than older stock. Copies of the leaflet may be obtained from the Department of Agriculture as long as the supply lasts, or they may be purchased from the Superintendent of Documents, Government Printing Office, Washington, D. C., at five cents per copy.

Swedish Veterinarians Visit Chicago

Drs. Gustav Danelius, of Linköping, and Hans Sandberg, of Jordholmen, Swedish district veterinarians, were in Chicago for several days during the latter part of September. After visiting the A.V.M.A. secretariat, they were escorted through the stock yards, several large packing plants and other points of interest. Before their arrival in Chicago they had been the guests of Dr. W. W. Dimock, in Lexington, Kentucky. Their next stop, after leaving the Windy City, was to be Ithaca, New York.

TUBERCULIN REACTIONS IN CATTLE SHOWING NO VISIBLE TUBERCULOUS LESIONS ON POSTMORTEM*

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In the early days of the study of bovine tuberculosis in this country, a reaction to tuberculin was attributed to infection with the bovine type of tubercle bacillus, even though on postmortem examination no lesions of tuberculosis could be found. In such cases, it was assumed that lesions were present, either occult or too minute to be observed macroscopically. This assumption seemed to be logical and undoubtedly the vast majority of no-visible-lesion reactors belonged in this category. The occasional occurrence of no-visible-lesion reactors, especially those showing somewhat atypical reactions, in herds from which bovine tuberculosis had been eradicated or in herds in which there was no history of tuberculosis, gradually aroused a suspicion that some agent other than the bovine tubercle bacillus was capable, at times, of causing a sensitization to tuberculin.

It is believed that Traum,¹ in 1916, was the first to call attention to the fact that certain reactors in which no lesions of tuberculosis could be observed on autopsy showed subcutaneous swellings or nodules, usually on the extremities, and that in these growths acid-fast organisms could frequently be found. This type of reactor has since been observed in practically every section of the United States and has been studied extensively by many investigators. The acid-fast organism involved is so extremely refractory to cultivation that little of a positive nature has been learned until recently, when Daines reported the repeated culturing of a non-acid-fast diphtheroid from which acid-fast cultures were eventually obtained, and the author succeeded in culturing two strains in an indirect manner to be described later. Neither Daines' organisms nor the two recovered at this Station correspond to any of the recognized types of tubercle bacilli but are capable of causing swellings on subcutaneous inoculation in cattle and creating a slight sensitization to mammalian tuberculin.

If it be granted that the reactions in cattle in which no glandular lesions are observed on postmortem inspection may be due, in some instances, to infection with the bovine tubercle bacillus,

*Received for publication, May 27, 1936.

and in other instances to be so-called skin lesions, there still remain other reactors which cannot be placed in either group.

Several years ago, a questionnaire was sent to many field inspectors of the Bureau of Animal Industry in the hope of discovering some common factor or factors peculiar to no-lesion reactors. This questionnaire covered the history of tuberculosis in the herd, presence of avian tuberculosis in chickens, tuberculous attendants, character of soil, water supply, feeding of milk powder, presence of rats, and so forth. No point in common was found. The answers elicited showed that no-lesion reactors might occur in herds in which there was no history of tuberculosis; that avian tuberculosis might or might not be present; that in only a very few instances were there tuberculous attendants; that soil might be low and swampy or high and dry; and that rats were usually but not always present. In most sections the majority of no-lesion reactors were found in herds in which tuberculosis was present.

The avian and human tubercle bacilli have been mentioned as possible sources of sensitization of cattle to tuberculin and information has been obtained to show that in some instances these two organisms contribute to these no-lesion cases.

From other available data, notably the findings of Hastings and Beach,² it would appear that there are still other acid-fast organisms, apparently harmless as far as causing lesions is concerned, which are capable of setting up a state of sensitization to tuberculin in bovine animals.

It must be recognized, therefore, that no one type of acid-fast organism can alone be incriminated as the causal factor in this condition; nor only the three recognized types of tubercle bacilli, but that certain other acid-fasts, probably saprophytic by nature, are also possible factors in no-lesion cases.

Whether other organisms than acid-fasts are capable of sensitizing to tuberculin is very questionable. Holth³ has stated that animals affected with the Bang bacillus at times react to tuberculin. Guinea pigs have been inoculated with virulent cultures of *Brucella abortus* at this Station and weekly tuberculin tests made for a period of three or four months, but no definite reactions have been obtained. During the last 15 years, several hundred cattle affected with Bang's disease have been tested with tuberculin at this Station, but in no case has one of these animals reacted to the tuberculin test in which lesions of tuberculosis have not been found on autopsy. This evidence would seem to rule out the probability of sensitization to tuberculin by the contagious abortion organism.

Experiments made at this Station and data gathered from Bureau field workers on the various agents causing a sensitization to tuberculin in bovine animals will be discussed.

AVIAN TUBERCLE BACILLUS SENSITIZATION

The part played by the avian tubercle bacillus in sensitizing cattle to mammalian tuberculin is probably extremely slight. However, this kind of sensitization does occur occasionally.

Schalk⁴ exposed cattle to tuberculous chickens and the cattle became sensitive to avian tuberculin but not to mammalian.

Elder and Lee⁵ injected avian cultures into six cattle. Three reacted to mammalian tuberculin. The reactions were marked 2X, 2X and 3P respectively.

Dr. T. S. Rich, Bureau inspector in charge of tuberculosis eradication at Lansing, Michigan, has reported to the writer many instances of apparent sensitization to mammalian tuberculin of cattle in contact with tuberculous chickens. Several other Bureau inspectors have made similar reports.

A most interesting case of sensitization with the avian tubercle bacillus is one that came under observation a short time ago. In April, 1930, a shipment of 42 Guernsey cattle was received at the port of importation at Baltimore, Maryland. These cattle had been purchased on the island of Guernsey and were reported to be negative to the tuberculin test before shipment. At Baltimore, subcutaneous and ophthalmic tuberculin tests were made and seven animals gave typical thermal and ophthalmic reactions. Two of the reactors were killed at the Baltimore stockyards but no lesions were observed. The remaining five reactors were sent to this Station, where they were placed in specially constructed stables, practically in a state of quarantine.

In September, 1930, the five cattle were tested intradermically, subcutaneously and ophthalmically. Two reacted slightly to the subcutaneous test, and one (cow 41) of these two animals reacted slightly to the intradermic and ophthalmic tests. The others had lost their sensitization.

Cow 41 was slaughtered, October 7, 1930, and a very careful postmortem examination was made. A necrotic focus was found in the tonsil and several slightly hemorrhagic areas were observed in various lymph-glands. The skin showed no abnormalities. Smear preparations of tonsil and hemorrhagic areas in lymph-glands were stained but no acid-fast organisms could be found. Sixty guinea pigs were injected subcutaneously with sections of 14 different lymph-glands and tonsil, four guinea pigs with each specimen.

In February, 1931, all guinea pigs were tested intradermically with tuberculin. All injected with the precrural and prescapular glands and one each from three other groups showed fairly well-marked reactions.

One of the four injected with the precrural gland, which showed a 2-cm reaction, was killed but no lesions were observed. Cultural and microscopic examinations of the different organs and lymph-glands of this animal were negative. On March 31, 1931, or approximately six months after inoculation, the surviving animals were killed. In six, small necrotic areas were observed in the liver. These lesions were pooled, emulsified and injected intra-abdominally into four normal guinea pigs. On June 3, all four of these guinea pigs gave well-marked reactions to tuberculin. One of these four (guinea pig 19364) was killed on June 8. No abnormalities were observed except two pinpoint areas of necrosis on the liver, a slight thickening of the omentum and a slightly enlarged and watery condition of one mesenteric and the portal glands. Liver and spleen, though normal in appearance, were cultured on serum-potato agar.

On July 20, or 42 days after inoculation, one tube cultured from the spleen of guinea pig 19364 showed seven grayish-white colonies, rounded and raised, from 0.5 to 1 mm in diameter. These colonies proved to be acid-alcohol-fast organisms. Subcultures, made on a similar medium, grew slowly, growth being apparent within eight days, and after two weeks had the moist, glistening appearance of avian tubercle bacilli. This organism was designated "KC 41" and will be referred to hereafter by this name.

On August 8, 50 mg of culture, moist weight, were removed from several tubes and suspended in 50 cc of sterile saline solution. Typing tests were made on 12 guinea pigs, 4 rabbits and 3 chickens. Six guinea pigs received each 0.5 cc subcutaneously and six each 1 cc intra-abdominally; two rabbits received each 2 cc subcutaneously and two each 1 cc intravenously; and two chickens each 0.5 cc intravenously and one, 0.5 cc subcutaneously.

On August 17, six yearling calves were inoculated with a similar suspension, three receiving each 10 mg in 10 cc of saline solution intravenously and three a like amount subcutaneously. In addition, four chickens were fed a mixture of 30 mg of this culture in $\frac{1}{2}$ lb. of corn-meal mash on September 14, 21, and 26, 1931. This organism proved to be virulent for all species of animals injected.

Five of the six guinea pigs injected intra-abdominally died as follows: 2, 25 days; 1, 26 days; 1, 32 days, and 1, 50 days after inoculation. One of this group survived and when killed, nine

months later, showed no lesions. The three dying first showed a fibrinous pleuritis in the apex of the thoracic cavity, with bloody effusion, and enlarged smooth spleen; the other two, chiefly an enlarged spleen. All had lost considerable weight.

The two rabbits injected intravenously died 18 and 29 days, respectively, after inoculation. There were no lesions in either other than slightly enlarged spleen and liver. Five hundred to 1,500 acid-fast organisms were observed in each microscopic field in smear preparations from liver and spleen. One rabbit injected subcutaneously died after 85 days of a posterior paralysis. There were no lesions of tuberculosis other than an abscess at site of inoculation. No acid-fast organisms were found in internal organs. The second rabbit, injected subcutaneously, was in very poor condition 244 days after inoculation and was killed. This animal showed extensive bone and joint lesions in the left hind leg, from which numerous acid-fast organisms were observed on microscopic examination.

The three chickens receiving injections died 29, 32, and 34 days, respectively, after inoculation. There were no lesions of tuberculosis other than an extremely enlarged liver and a slightly enlarged spleen, from which organs 50 to 300 acid-fast organisms were observed per microscopic field in smear preparations.

The four chickens fed cultures in corn-meal mash died 86, 208, 217, and 231 days after the last feeding. The first showed slight lesions of tuberculosis, and death was due to rupture of the liver, probably caused in making a tuberculin test on the day before death. The remaining three showed very extensive lesions of tuberculosis and the birds were emaciated.

Two chickens and six guinea pigs were inoculated with an emulsion of the spleen of one of the guinea pigs inoculated intra-abdominally, and another group of two chickens and six guinea pigs was inoculated with an emulsion of the liver of one of the chickens injected intravenously. In both groups, the chickens died of generalized tuberculosis, while the guinea pigs showed no lesions when autopsied several months later, thus giving conclusive evidence that the acid-fast organism in question was an avian type of tubercle bacillus.

The three calves inoculated intravenously began to show signs of listlessness about two weeks after inoculation, gradually becoming weaker and losing flesh. Two died, 32 and 34 days after inoculation, and the third was in poor condition for several months but gradually recovered. The lesions in the two that died were similar, showing mainly an edema of the lungs and enlarged and watery bronchial and mediastinal lymph-glands. Acid-fast

organisms were very numerous in smears made from these parts. A tuberculin test of the four surviving calves was made, October 21, 1931, or 65 days after inoculation, with mammalian tuberculin. The calf inoculated intravenously gave a suspicious reaction and the three injected subcutaneously were marked suspicious, 3P and 3X, respectively. Tested on December 15, 1931, with an autogenous tuberculin (which was proved to be avian), the reactions were in the order given above, 2X, suspicious, 3X and 3X, respectively. Regular Bureau avian tuberculin injected simultaneously showed curiously only a slight reaction in two of these animals.

As a further proof that this "KC 41" germ was a pure avian type of the tubercle bacillus, a tuberculin was prepared from it by Dr. M. Dorset, Chief of the Biochemic Division. Several tuberculous flocks were tested, using this tuberculin in one wattle and regular Bureau avian tuberculin in the opposite wattle. Each bird reacting to the regular avian tuberculin showed a reaction of at least equal intensity to the "KC" tuberculin.

Considerable detail has been used in describing the culturing and typing of this "KC 41" organism on account of the unusual manner in which it was recovered and the virulence it manifested in species of animals usually refractory to the avian tubercle bacillus. Intravenous or intra-abdominal injections of cultural suspensions produced the Yersin type of disease in all species of animals so treated.

Probably the most important feature of this work with the "KC 41" organism, other than the continued passage of the sensitizing agent from cattle to guinea pigs without causing manifest lesions in either species, is the fact that the organism caused a definite sensitization in cattle to mammalian tuberculin. That strains of avian tubercle bacilli are dissimilar in this respect is shown in Schalk's experiments. What conditions are necessary, either in the microorganism or in cattle, to cause such a sensitization opens up a field for speculation, but the fact remains that avian tubercle bacilli are capable at times of causing in cattle a sensitization to mammalian tuberculin.

HUMAN TUBERCLE BACILLUS SENSITIZATION

About 35 years ago, just prior to the bovo-vaccination period, considerable experimentation was done at this Station with the human tubercle bacillus. Glandular and organic lesions caused by the human tubercle bacillus, from humans, monkeys, rabbits and guinea pigs, and pure cultures and human sputum were fed or injected subcutaneously into cattle. This work was done to

ascertain the susceptibility of bovines to the organism recovered from serious or fatal disease in man, or other species of animals inoculated with human lesions. In all, 23 cattle were so treated, some once and others many times. None showed generalized lesions on autopsy. Occasionally an animal treated subcutaneously would show an abscess at the site of inoculation, from which virulent human type organisms could be recovered many months later. Another salient feature was the fact that, of the 23 animals, 16 gave positive reactions to the subcutaneous tuberculin test, two suspicious reactions, while only six failed to react. A peculiarity in connection with the sensitization was that, as a rule, only one reaction was obtained, this in spite of the fact that a local abscess at times persisted. One interesting case (cow 218) was treated with a culture suspension of human tubercle bacilli, which was allowed to gravitate into one quarter of the udder through a rubber tube attached to a milk-tube. A few months later, a positive reaction was obtained but eight subsequent tests during the eleven years following were negative, although virulent, human-type tubercle bacilli were excreted from the infected udder during the entire period of the life of this animal from 1901 to 1912.

One of the aforementioned cattle (cow 237) was drenched with various lesions and sputum six times over a period of three months, after which a tuberculin test was positive. Five similar drenchings were given during the following three months but two subsequent tuberculin tests were negative and no lesions were observed when the animal came to autopsy, eleven months after the first feeding.

The possibility of sensitizing a bovine animal with sputum from a tuberculous attendant has often been suggested. The only case on record at this Station of a cow being treated with sputum was the last case described (cow 237), but this animal was also drenched with glandular lesions, so the part played by the sputum is not known. In order to gain definite information in this connection, an experiment was made in 1931, in which six cattle were fed one to 20 times with freshly obtained sputum from a local tuberculosis sanatorium.

About $\frac{1}{2}$ ounce of sputum was placed in a bucket of water and the animal allowed to drink this mixture. All other water was withheld. The six cattle were drenched as follows: one animal, once; the second, 3 times; the third, 5 times; the fourth, 10 times; the fifth, 15 times, and the sixth, 20 times. The drenchings were made daily except Sundays, the first being made on April 1, 1931, and the last on April 24. Each batch of sputum

was tested for virulence on guinea pigs and all guinea pigs died of tuberculosis.

TABLE I—Results of tuberculin tests in cattle fed various amounts of sputum from human tuberculous patients.

BOVINE	SPUTUM FEEDINGS	RESULTS OF INTRADERMIC TESTS			RESULTS OF SUBCUTANEOUS TEST
		JUNE 9	AUG. 4	OCT. 27	JAN. 28, 1932
1663	1	3X	2X	?	—
1584	3	—	2X	3P	—
1589	5	?	—	—	—
1577	10	—	—	—	—
1666	15	?	—	—	—
1662	20	2X	—	—	—

Key:

3X indicates a thickening of fold 3 times normal size.

3P indicates a rounded or pea-shaped swelling 3 times the diameter of a pea.

? indicates suspicious or questionable reactions.

— indicates no reaction.

These six cattle were tested intradermically with tuberculin on June 9, August 4 and October 27, 1931, and subcutaneously on January 28, 1932. The results, as shown in table I, reveal the fact that three animals of the six were sensitized sufficiently to cause a positive reaction to tuberculin. Two other cattle showed a slight disturbance at the site of injection of tuberculin but insufficient to be termed a positive reaction. Probably the most striking feature of this experiment was the fact that the two cattle fed the least number of times were sensitized the most. None of the animals showed lesions of tuberculosis when killed the latter part of January, 1932.

SKIN-LESION SENSITIZATION

The so-called skin lesions often observed in reacting cattle have been described previously by the author⁶ and many others. These nodules, occurring under the skin on the legs, are tubercle-like in character and generally harbor acid-fast organisms. Not all animals manifesting these skin nodules react to tuberculin, but the evidence is very conclusive that there is an association between these skin nodules and the sensitization to tuberculin. For instance, in one herd of 200 cattle coming under the author's observation, five animals showed typical skin nodules. When the herd was tested, seven reactors were found of which four were animals showing skin lesions. One of the skin-lesion cases failed to react. In another herd, an inspection of approximately 300

cattle showed 23 with skin lesions. When tested, there were found 22 reactors, 15 of which were of the group of 23 showing skin lesions. In neither of these two herds had tuberculosis been present for a number of years.

It will thus be seen that there is manifestly a relationship between the skin nodule and the reaction, but that not all cattle showing skin lesions react, and furthermore, that there are other cattle in the same herds which react to tuberculin but show no skin lesions. The most simple explanation of these reactions is that one causal agent is involved.

It is assumed that the acid-fast organisms found in these subcutaneous tubercular nodules of cattle are responsible for the sensitization to tuberculin. Since no other microorganism than an acid-fast has been found to sensitize to tuberculin, this assumption appears to be true. The greatest difficulty in determining the causation of the skin nodule is the extreme refractoriness of this acid-fast organism to growth on culture media. Another anomaly is that these lesions cannot be transmitted from animal to animal.

Practically every investigator working with these skin nodules has reported his inability to grow the acid-fast organism primarily in pure culture. Daines⁷ has succeeded in obtaining a number of cultures of acid-fast organisms from these skin lesions. He reports that almost invariably he obtains a non-acid-fast diphtheroid organism primarily, on old cultures of which an acid-fast organism sometimes develops.

Two apparently identical acid-fast organisms have been recovered at this Station from skin lesions received from widely separated areas, one from New Mexico and one from Maryland.

FORT BAYARD SKIN LESION ACID-FAST MICROORGANISM

On August 5, 1931, several typical skin lesions were received from the U. S. Veterans' Bureau Tuberculosis Hospital, Fort Bayard, New Mexico. Culture media were inoculated with material from each of these lesions but on none was an acid-fast growth obtained. From one lesion, which showed numerous acid-fast organisms on microscopic examination, several grams of the inner portions were removed, aseptically, emulsified in 20 cc of sterile saline solution, and filtered through sterile gauze. Two cc of this emulsion were injected intra-abdominally into each of six normal guinea pigs. On September 28, these guinea pigs were tested with tuberculin but none of the reactions could be called positive. One of these guinea pigs (21688) was killed October 1, 1931, and ten serum-potato-agar tubes were inoculated from

its apparently normal spleen and liver. On November 17, 1931, one of the tubes inoculated with splenic material showed a brownish yellow colony about 1 mm in diameter. Subcultures were made of this chromogenic organism which proved to be a pure acid-fast culture. The subcultures grew slowly, growth being apparent about the tenth day, but in four weeks a heavy, moist, yellowish-brown growth was present over the entire surface of each tube.

On February 10, 1932, tests were made for virulence of this acid-fast organism in 6 guinea pigs, 2 rabbits, 3 chickens and 2 cattle. Seventy-five mg of culture was suspended in 75 cc of sterile saline solution and inoculations made from this suspension.

RESULTS

Guinea pigs: Six guinea pigs were inoculated intra-abdominally, three with 2 cc each and three with 4 cc each. These guinea pigs were tested with avian and mammalian tuberculin two months later and reacted to both but much more pronouncedly to avian tuberculin. When killed one year after inoculation, none showed lesions.

Rabbits: One rabbit was inoculated subcutaneously with 0.5 cc of suspension and one with 0.5 cc intravenously. They were found to be normal when killed one year later.

Chickens: Three chickens inoculated; one intravenously with 0.2 cc; one intravenously with 0.5 cc, and one subcutaneously with 0.5 cc. Tested May 23 (ten weeks later) with avian and an autogenous tuberculin in right and left wattles, respectively; they reacted in the order stated, as follows: avian tuberculin, 2X, 3X, 3X; autogenous tuberculin, 0, 0, 3X. Tested July 18 (17 weeks after inoculation) with the same tuberculin, they reacted respectively: avian tuberculin, 0, 2X, 4X; and with the autogenous tuberculin, 0, \pm , 4X. When killed, December 5, 1932, no lesions were visible.

Cattle: Two cattle were inoculated as follows: No. 1688, 5 cc of suspension injected subcutaneously in left front leg, left hind leg, and left shoulder; No. 1755, 10 cc of suspension injected intravenously. Both animals were tested, April 8, 1932, with mammalian and an autogenous tuberculin. Both reacted to the autogenous tuberculin (2X and 2X respectively) and No. 1688 gave a suspicious reaction to mammalian tuberculin.

Bovine 1688 showed a diffuse swelling at each site of inoculation about two weeks after injection, becoming soft at one month. The swelling on the left front leg was about $1\frac{1}{2}$ inches in diameter and extended outward $\frac{3}{4}$ inch, five months after injection. On September 1, the animal appeared to be losing flesh and suf-

fering from diarrhea. Numerous vibrios were found in the feces at this time. On October 8, 1932, the animal was greatly emaciated, very weak and suffering from mucoid diarrhea with occasional blood clots. The animal was killed. The postmortem examination showed a greatly thickened cecum, practically one-third the area of the mucous membrane of which was covered with brownish ulcers. No acid-fast organisms were found in feces or in scrapings of the cecal erosions. The skin swellings at sites of injection were greatly resolved.

Bovine 1755 remained healthy during the entire period of observation and when killed, one year after injection, was found to be normal.

On August 16, 1933, two other bovine animals were inoculated subcutaneously in the region of the right front and hind legs and shoulder with suspensions of this Fort Bayard acid-fast organism. Definite swellings were apparent at the sites of inoculation within two weeks. These swellings were at first diffuse, becoming rounded and soft without discharging four weeks after inoculation. When killed seven months after inoculation, these animals showed nodes on the legs about 2.5 inches in diameter and projecting about 2 inches. Tests were made three and seven months after inoculation, with avian and mammalian tuberculin, and a positive reaction was obtained only to avian tuberculin. When these animals were killed on March 17, 1934, the nodes were dissected and were found to consist of dense connective tissue capsules enclosing creamy yellowish-brown pus. From one of these nodes, an acid-fast organism was recovered which culturally and by animal inoculation proved to be identical to the organism originally injected.

A "tuberculin" was prepared from this Fort Bayard skin-lesion, acid-fast organism by the Biochemic Division of the Bureau, with a view to its use in field tests of herds in which skin lesions were prevalent. The results of these tests will be reported later.

"POOLE" SKIN-LESION, ACID-FAST ORGANISM

Another chromogenic acid-fast organism, similar to the one recovered from the Fort Bayard skin lesion, was recovered in 1932 from the skin lesion of a reacting cow in nearby Maryland. The organism is named "Poole," after the owner of the cow. This animal was the only reactor in a herd in which there had been no tuberculosis for a number of years. It was brought to the Experiment Station where a biopsy was performed on January 5, 1932, and an irregularly shaped multilocular mass about 2 inches thick and 2½ inches in diameter removed from under the skin of

the right shoulder. Another smaller nodule was observed on the outer aspect of the right hind leg near the fetlock. The nodule removed was a typical skin lesion adherent to the inner surface of the skin, each cell being filled with yellowish-brown, broken-down tissue. About 15 grams of inner portions of this lesion were removed aseptically and ground in a mortar with 50 cc of sterile saline solution. Nine guinea pigs were injected intraperitoneally each with 5 cc of this emulsion. A number of different kinds of media were inoculated with the emulsion but none showed evidence of acid-fast growth when they were discarded four months later.

Starting three weeks after being injected, one guinea pig was sacrificed weekly and serum agar and Hohn's medium were inoculated from the apparently normal spleen and liver of each guinea pig. On April 26, 1932, one tube of Hohn's medium, which had been inoculated on March 12, showed nine round, yellowish-brown colonies each about one mm in diameter. One of these colonies was removed and stained with carbol-fuchsin. This showed a pure culture of an acid-fast organism similar in morphology to tubercle bacilli. Subcultures of this organism were made on serum agar. Visible growth was apparent in ten days, and in four weeks a heavy, moist, yellowish-brown growth covered the entire surface of each tube. Except for the color, the growth had the appearance of newly cultured avian tubercle bacilli.

Typing tests of this organism were made as follows: 50 milligrams of a one-month-old culture was suspended in 40 cc of sterile saline solution and the following injections were made:

- 2 chickens injected intravenously each with 1 cc suspension.
- 2 rabbits injected intravenously each with 1 cc suspension.
- 3 guinea pigs injected subcutaneously each with 1 cc suspension.
- 3 guinea pigs injected intraperitoneally each with 1 cc suspension.
- 2 cattle injected subcutaneously in the outer area of the left front and hind legs near the fetlock and the left shoulder, 5 cc being injected in each site.

Results in chickens: Both were killed six months after inoculation and were apparently normal. One chicken gave a 2X reaction to avian and a 3X reaction to Fort Bayard tuberculin two months after inoculation and the other chicken failed to become sensitized to either.

Rabbits: One rabbit died of cystitis three months after inoculation; liver showed several encapsulated "pearls," smears of which, when stained, revealed non-acid-fast coccoid organisms. Subinoculation of these lesions into two other rabbits failed to produce disease. The second rabbit was killed about one year after inoculation and showed a congestion of the subcutis of the

belly, an irregular thickening of the spleen, and three whitish tubercles on the liver 2 to 4 mm in diameter; these lesions were pooled and injected into two healthy rabbits which, when killed ten months later, were apparently normal.

Guinea pigs: Two of the six guinea pigs, when killed about ten months after inoculation, showed encapsulated abscesses in the omentum, and the remainder were normal. Tuberculin tests made two months after inoculation with avian, Fort Bayard and mammalian tuberculins gave average reactions of 12 mm, 13 mm and 7 mm, respectively.

Cattle: Diffuse swellings appeared at the sites of inoculation on each bovine within ten days after inoculation which became extensive at 30 days. Several of these swellings developed into abscesses which broke, discharging a creamy yellow pus about 60

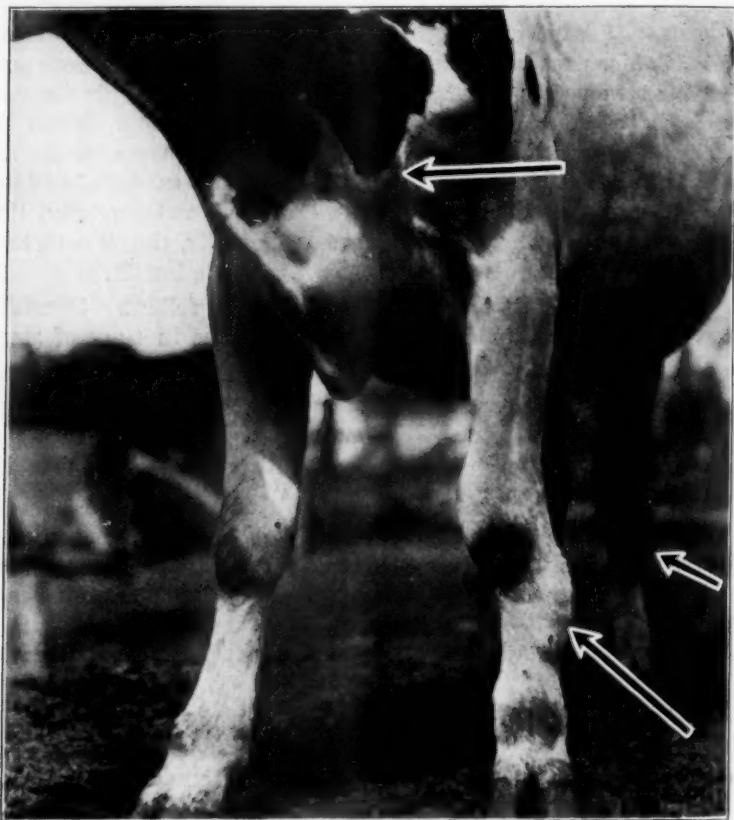


FIG. 1. Front view of steer 1653, showing swellings caused in two months by the subcutaneous injection of an acid-fast microorganism (Poole strain) recovered from a skin lesion.

days after inoculation. The swellings gradually resolved and had practically disappeared seven months later. Tuberculin tests with Fort Bayard and mammalian tuberculins, made two months after inoculation, showed 3P and 2X reactions, respectively, in one animal and 3P and suspicious in the other animal. Another tuberculin test, made four months after inoculation, with avian and Fort Bayard tuberculins, elicited a suspicious reaction only to avian tuberculin in one animal, and a 2P reaction to avian in the other bovine.

About one year after the first inoculation, these two bovines were reinoculated in the same manner with the same organism, the sites of injection being on the right front and hind legs and the right shoulder. Within two weeks, marked swellings were noticeable at all points of injection. These swellings became progressively larger, reaching their maximum in about three months, after which they resolved slowly, forming firm nodules, vestiges of which were still present when the animals were killed nine months after the second inoculation.

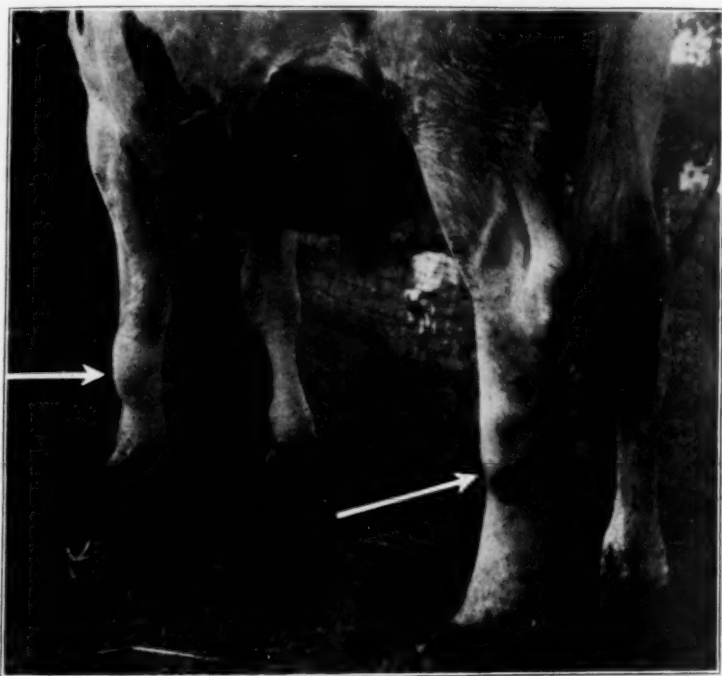


FIG. 2. Rear view of steer 1653, showing swellings caused in two months by the subcutaneous injection of an acid-fast microorganism (Poole strain) recovered from a skin lesion.

A tuberculin test with mammalian tuberculin, made one month after reinoculation, was negative in both animals and a second test with avian and mammalian tuberculins made a month later elicited 4P and 3X reactions respectively, to avian tuberculin and a suspicious reaction to mammalian tuberculin in one animal.

In order to obtain information as to whether acid-fast organisms similar to those cultured from the spleens of guinea pigs inoculated with the Fort Bayard and Poole skin lesions could be cultured from normal guinea pigs, 14 healthy, unused guinea pigs were placed in pens in the hospital where inoculated animals are kept. Beginning one week later, at weekly intervals, one of these animals was killed and several tubes each of serum agar or Hohn's medium were inoculated from its spleen. From none could an acid-fast organism be grown. No similar growth has ever been observed at this Station in the many inoculations that have been made from splenic material of guinea pigs.

The two similar acid-fast organisms recovered from the spleen of guinea pigs inoculated with skin-lesion material cannot be positively incriminated, for obvious reasons, as the causal agent of bovine skin lesions. The fact that the acid-fast organisms in skin lesions are so refractory to primary growth on culture media, a condition which was encountered in the cultivation of the acid-fast in human leprosy and Johne's disease, and the further fact that these skin lesions cannot be transmitted in series in cattle, a condition which seems to be analogous to that of human leprosy, naturally prohibit any positive statement of cause in this connection.

The knowledge that has accumulated during the last few years of the dissociation of bacteria, including tubercle bacilli, would make less untenable the possibility of a transition in the acid-fast of skin lesions by passing it through guinea pigs. Other factors which lend support to the possibility that the two strains recovered may be the causal agent in skin lesions are:

- (1) The organisms recovered are of practically the same color as the contents of skin lesions, these acid-fast organisms on injection into cattle cause lesions somewhat similar to "skin lesions," and the broken-down tissue in these artificial lesions has practically the same orange-brown shade of natural skin lesions.

- (2) The organisms in question, while not causing progressive lesions, cannot be called true saprophytes as they are capable of causing definite tissue changes in cattle.

- (3) Culturally these organisms are similar to those recovered by Daines from old cultures of a diphtheroid which he obtains primarily in his culturing of skin lesions.

(4) The sensitization caused in guinea pigs and cattle by these organisms, while more positive for avian tuberculin, is always slightly positive to mammalian tuberculin in guinea pigs and occasionally in cattle.

(5) No organism similar to the one in question has ever been cultured from the splenic material of guinea pigs in the investigation of tuberculosis or other diseases at this Station, nor in 14 normal guinea pigs for which search was specifically made.

The statement has been made to the author that since cattle with skin lesions react to tuberculin, the lesions must be the result of infection with the bovine tubercle bacillus. Since most of the tuberculin used in cattle-testing in the United States is made from human tubercle bacilli, it would seem as logical to presume that the infection was due to the human tubercle bacillus. Tuberculin sensitization is not specific to the type of acid-fast organism causing it, as is shown in avian tuberculosis and Johne's disease, two diseases which have never been shown to be related to each other, yet avian tuberculin and johnin are equally good diagnostic agents in each of these diseases. The same condition exists in the relation of human and bovine tuberculins to human and bovine tuberculosis. The fact that the two acid-fast strains recovered by the author indirectly from skin lesions cause more of a sensitization to avian tuberculin than to mammalian tuberculin does no more than suggest that these similar strains may be mutant, avian-type organisms.

When all the data gathered in connection with skin lesions in cattle are analyzed, it would not seem logical to assume that this condition is the result of infection with human, bovine, or avian tubercle bacilli, but rather to assume that it is the result of infection with one of the numerous acid-fast organisms which appear to be present in all soils.

REACTION TO FORT BAYARD TUBERCULIN IN TUBERCULOUS CATTLE AND IN CATTLE SHOWING SKIN LESIONS ONLY

When an acid-fast organism was recovered from a guinea pig that had received an injection of skin lesion material from a reacting cow in the herd at the U. S. Veterans' Bureau Hospital at Fort Bayard, New Mexico, it was hoped, if the organism showed any degree of specificity, to prepare a "tuberculin" from it to be used in connection with standard tuberculin in those areas where skin-lesion cases are found more commonly. Accordingly, a tuberculin-like substance was prepared from this organism, which will be referred to hereafter as "Fort Bayard tuberculin." In a group of guinea pigs which had been sensitized with the Fort

Bayard skin-lesion organism, comparative tests were made with Fort Bayard tuberculin, avian tuberculin, and standard Bureau tuberculin, the average reactions to these tuberculins being 11 mm, 9 mm and 5 mm, respectively. In similar tests made in guinea pigs sensitized by the "Poole" skin-lesion acid-fast, the average reactions to Fort Bayard, avian and mammalian tuberculins were 14 mm, 13 mm and 7 mm, respectively.

Through the coöperation of Dr. H. M. O'Rear, of the Tuberculosis Eradication Division, tests were made in New York State in seven tuberculous herds. Eighteen animals in these herds reacted to the standard tuberculin and one of these 18 gave a "very slight" reaction to Fort Bayard tuberculin.

In the tuberculous herd at this station, eight animals were tested simultaneously with standard and Fort Bayard tuberculins. All reacted to standard tuberculin and two of the eight also reacted to the Fort Bayard tuberculin, the reactions to the latter being comparable in size to those produced by Bureau tuberculin.

Dr. Hadleigh Marsh, of Helena, Montana, who has reported the "teat lesion" type of reactors,⁸ in which nodules usually from 1 to 5 cm in diameter are found under the skin of the teats of cows, kindly consented to have comparative tests made of these tuberculins in the herds in which teat lesions were previously observed. Of 146 cattle tested, only six showed any degree of reaction. Five of these reacted alike to both tuberculins. The sixth reacted very slightly to standard tuberculin only. Teat or scrotal lesions were present in four of the five animals reacting to both tuberculins. Twenty cows showed old teat lesions but failed to react.

Through the courtesy of Dr. A. E. Wight, Chief of the Tuberculosis Eradication Division, comparative tests of these two tuberculins were made on the 300 head of cattle comprising the herd at the U. S. Veterans' Hospital at Fort Bayard. Six of these animals reacted to standard tuberculin and four of these six reacted to Fort Bayard tuberculin but the reactions to the latter tuberculin were slighter, as a whole, than to standard tuberculin.

It will thus be seen that standard tuberculin is a better agent than Fort Bayard tuberculin in eliciting a reaction in animals affected with tuberculosis and in those harboring skin lesions only. Of 26 tuberculous cattle reacting to standard tuberculin, only three (11.5 per cent) reacted to Fort Bayard tuberculin. Of twelve animals affected with skin lesions reacting to standard, nine (75 per cent) also reacted to Fort Bayard tuberculin. These results show that little practical use can be made of Fort Bayard tuberculin in the separation of skin-lesion reactors from tuber-

culous animals but they are of interest in that they show that 75 per cent of skin-lesion cases, but only 11.5 per cent of tuberculous cattle, reacted to Fort Bayard tuberculin.

RELATION OF SOIL ACID-FAST ORGANISMS TO SKIN LESIONS IN CATTLE

The location of skin lesions in cattle is a factor which would lead to the belief that these lesions may be the result of the introduction, through abrasions in the skin, of organisms from or associated with soil. Frey and Hagan⁹ have shown from the culturing of 100 samples of soil from various sections of the United States and one from Switzerland that acid-alcohol-fast organisms were present in every sample. Using their technic, a sample of soil from the pasture land of the herd of the U. S. Veterans' Bureau Hospital at Fort Bayard was cultured. Microscopic examination of this medium was made from time to time and the acid-fast flora was amazing. Practically every size and shape from long slender threads to short plump rods and granules were observed. It is a long and tedious operation to obtain any of these organisms in pure culture and it was several months before one was recovered. This was a rapidly growing, dry, rough, brownish-colored culture and it proved to be innocuous for laboratory animals and cattle and was incapable of causing a sensitization to tuberculin. Since the technic of isolation required a temperature of 47.5° C., it is quite probable that only those acid-fast organisms which were thermophilic survived, and the one described was only one of the many present.

Frey and Hagan isolated 25 pure cultures of soil acid-fast organisms which they divided into three groups. The two strains of acid-fast isolated by the author from the guinea pigs inoculated with skin-lesion material seem to be associated with their group II, but their description does not altogether fit.

This work of Frey and Hagan, showing that a variety of acid-fast organisms were present in all soils examined, together with the fact that lesions attached to the under layers of the skin of cattle are located usually on those portions of the skin which are most apt to become abraded and contaminated with soil, would support the assumption that one or possibly several of the soil acid-fast may be the cause of the so-called skin lesions in cattle and a portion of the other reactors in which no lesions can be found on routine postmortem examination.

NO-VISIBLE-LESION REACTORS ASSOCIATED WITH "SKIN LESIONS"

In examining the postmortem charts of reactors in which no tuberculosis is present, many instances are observed where of,

say, ten reactors, seven will show skin lesions and the other three no lesions whatsoever. In the majority of such instances, the skin-lesion cases will outnumber the no-lesion cases three to one, but in a few instances the reverse is true, and occasionally a group of reactors will be found in which no visible lesions, skin or otherwise, are manifest. If a tubercle must be present before sensitization occurs, as Krause declares, it would seem logical to assume that the same organism which causes the visible skin lesions has produced some minute lesion not visible on macroscopic examination or so situated as to escape observation.

DISCUSSION

The vast majority of reactors of the no-lesion type have been due to infection with the bovine type of tubercle bacilli. Cattle become infected with tuberculosis but the lesions are not sufficiently gross at the time the tuberculin test is made and the animals slaughtered to be observable.

Unfortunately, in some instances other acid-fast organisms are also shown to be capable of sensitizing cattle to tuberculin, and with the lowering of the incidence of bovine tuberculosis, these non-specific types of reactors are becoming more noticeable. At the time this article is being written, 39 of the 48 states are shown to have an incidence of less than 0.5 per cent of bovine tuberculosis.* It thus seems urgent that all concerned in tuberculosis eradication, not only the veterinarians making the tests but the owners of the herds as well, should have such an understanding of these non-specific types of reactors as will enable them to lessen to some extent some of the difficulties that are bound to arise as the proportion of no-lesion cases to those showing lesions of bovine tuberculosis increases.

While the incidence of bovine tuberculosis is definitely on the decrease, in some sections, particularly in the north central states, avian tuberculosis has gained a firm foot-hold. Surveys of townships in certain of these states show as high as 80 per cent of the flocks infected. Avian tuberculosis is of further economic importance in that hogs readily become affected with the avian type of tubercle bacillus, resulting in the retention of carcasses in federally inspected packing establishments. Cattle are relatively immune to avian tuberculosis but it is easily seen that in those states where poultry tuberculosis is so prevalent, cattle may become sensitized by avian tubercle bacilli and thus form a source of disturbance in the cattle-testing program.

*The number of states is now 41.

The school of thought relative to the fixity of the various types of the tubercle bacillus seems to vary with different generations. Twenty-five to 30 years ago, the mutation of the bovine tubercle bacillus to the human type was advocated to explain the fact that humans who ingested the bovine type of tubercle bacillus during youth remained but slightly affected but in later years developed phthisis. It was suggested that the bovine bacilli, during their long sojourn in the human body, gradually developed into the human type. This theory was later refuted by the majority of scientific investigators and the thought prevailed that the three types of the tubercle bacillus were fixed and definite in their characteristics. The pendulum of thought relative to variation now appears to be swinging back towards mutation. Various reports have appeared in the literature recently which tend to show, if substantiated, that one type may be transformed into another.

Valtis¹⁰ and his collaborators report their ability to change the bovine tubercle bacillus into the avian type. The filtrate of a suspension of bovine tubercle bacilli, which was supposed to contain the filtrable form of this organism, was injected into guinea pigs and these animals were treated with the acetone extract of avian tubercle bacilli. An acid-fast culture was obtained from these treated guinea pigs which eventually could be developed into either a characteristic bovine or avian type, depending upon the technic used.

Plum¹¹ reported series of experiments using bovine and avian tubercle bacilli in which modification of these organisms was shown.

Holth¹² reports an interesting case on a farm in Norway where infection gradually spread from poultry to cattle and the tubercle bacilli recovered from the cattle, at first not capable of causing infection in guinea pigs, developed a virulence for guinea pigs after being passed through rabbits. Reports of this kind are usually explained by probable dual infection. Holth, however, is a reputable investigator and it is certain that he would not make a report of this nature if he were not satisfied that the conditions were as stated. It has long been recognized that certain strains of organisms, usually fixed in character, suddenly and for reasons not understood, develop a tendency to throw off mutant forms. The dissociation of practically all microorganisms, or their ability to develop different types of colony formation and a variation in virulence, is another factor which forces the conclusion that the fixity of bacteria is not so constant as we have been wont to believe. If the reports of Holth are true, it will thus be seen that avian tuberculosis will have a further bearing on the eradi-

cation of tuberculosis in cattle than merely the sensitization of cattle to tuberculin.

The sensitization of cattle by human tubercle bacilli forms a very small portion of the no-lesion type of reactors. This condition may occur in any herd in which there is a careless tuberculous attendant, but it is more apt to be found in institutions where inmates affected with tuberculosis are allowed access to cattle:

Cattle showing skin lesions and other reactors in the same herd showing no visible skin nodes but probably sensitized by the same agent, undoubtedly will continue to represent the chief source of error in the specificity of the tuberculin test. It is realized that the chromogenic acid-fast organisms reported by Daines and the two recovered indirectly by the author cannot be incriminated positively as the causal agents of skin lesions. The theory advanced that these skin nodes are the result of infection with soil acid-fast bacteria seems to be the most logical explanation of this condition.

From conversations with Bureau veterinarians, it is the consensus that animals of this kind usually react to tuberculin but once and that the reactions, usually but not invariably, are not so pronounced as the average reaction due to bovine tubercle bacilli. The few animals showing skin lesions kept at this Station not only failed to react on subsequent retests but the lesions gradually resolved until there was scarcely a vestige left in three years. In fairness to owners who desire to have and keep their herds accredited, it does not seem that such reactors should be classed as tuberculous. In regions where reactors of this kind are commonly found, it would seem advisable that skin-lesion reactors should be marked as suspicious and retested several months later, judgment being deferred until a comparison of the results of the two tests is made. This procedure obviously would require a knowledge of conditions as they exist in certain areas and on individual farms as well as a knowledge of the different kinds of non-specific reactions, and would necessitate a definite amount of discretion on the part of the veterinarians making the tests. It is believed that only by the application of these measures can a great deal of misunderstanding be avoided in the future of bovine tuberculosis eradication.

SUMMARY

1. Cases are cited in which cattle, reacting to the regular test for tuberculosis, are found to have been sensitized by avian tubercle bacilli and others by human tubercle bacilli:

(a) An avian type of tubercle bacillus was recovered from one of a group of reacting cattle imported from the island of Guernsey.

(b) An experiment in which six cattle were drenched with sputum from human consumptives resulted in three of the cattle developing a reaction to tuberculin. The animal receiving only one drenching developed the strongest reaction.

2. The method by which two chromogenic acid-fast organisms were recovered indirectly from skin lesions of reacting cattle is described. These organisms were found to be capable of causing subcutaneous swellings in cattle. The sensitization caused by these organisms was found to be stronger for avian than for mammalian tuberculin.

3. A "tuberculin" prepared from one of these two chromogenic acid-fasts was used in field tests in tuberculous cattle and in cattle showing skin lesions only. Of the tuberculous cattle, 11.5 per cent reacted to this tuberculin, while 75 per cent of skin-lesion cases reacted.

4. Suggestion is made that the skin nodules of cattle are the result of infection with soil acid-fast organisms.

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Mayos Visit Hawaii

Dr. and Mrs. N. S. Mayo, of Highland Park, Ill., have been enjoying a trip to Honolulu, where they have been royally entertained by the Hawaiian veterinarians, both civil and military. They were scheduled to leave for the "mainland" on October 16.

CLINICAL AND CASE REPORTS

A decorative banner at the top of the page. The text "CLINICAL AND CASE REPORTS" is written in a bold, serif font. To the left of the text is a small illustration of a vintage car. To the right is a small illustration of a person in a dynamic pose, possibly a dancer or athlete.

BRUCELLA SUIIS INFECTION OF THE BRAIN OF SWINE*

By G. T. CREECH, Washington, D. C.

Pathological Division, U. S. Bureau of Animal Industry

Prior to 1930, when Giltner¹ made his first report on vertebral lesions in swine caused by *Brucella suis*, the tissues invaded by this organism were thought to be chiefly those of the genital organs, as in cases of *Brucella* infection of cattle. Since that time, however, it has been fully demonstrated, both on post-mortem examination and through laboratory studies, that such vertebral lesions in swine are not uncommon. Likewise, joint lesions in swine due to *Brucella* infection are no longer considered rare. Comparatively few reports have been published relative to *Brucella* infection of swine in which any description has been given of lesions of the disease in the different organs or lymph-glands. Stein² observed one case at this laboratory, in which there were definite necrotic lesions in the cervical lymph-glands. There was also necrosis of the vertebrae of the same pig, and *Br. suis* was obtained in cultures from both lesions.

While making further studies of *Brucella* infection of the vertebrae of swine, Giltner† found nodular spleens in four cases, from three of which *Br. suis* was obtained in cultures. In one of these cases the nodules in the spleen were the only lesions found. In one case there was also vertebral involvement, and in the other two cases there were necrotic lesions of the sternum, from one of which *Br. suis* was obtained in cultures. The splenic lesions were described as small, spherical nodules, resembling small abscesses, the contents of which were usually dry, with a tendency to calcification.

L. E. Day‡ cultured two nodular spleens, at the Chicago branch laboratory of the Pathological Division, and recovered the *Bru-*

*Received for publication, May 16, 1936.

†Unpublished data.

‡Unpublished data.

cella organism from the lesions in both cases. During the past year, the writer reported a case³ of *Br. suis* infection in a pig in which there were well-marked lesions of the kidney, liver and hepatic lymph-gland.

In his studies of an epizootic of *Brucella* infection in swine in Denmark, Thomsen⁴ found, in addition to the lesions of the genital organs, also lesions of the joints, abscessed spleen and ribs, and in his experimentally infected pigs, nodules of the spleen and liver.

Recently an exceptionally interesting case of *Br. suis* infection in a hog was received at the Pathological Division. The case was forwarded for laboratory diagnosis especially because of the very unusual character and location of the lesion, which involved the brain. Dr. G. W. Knorr, inspector-in-charge, Frankfort, Ind., who forwarded the specimen, was unable to obtain any definite history of the case. The animal was one of a miscellaneous lot of sows, without definite identity, which precluded the possibility of tracing the origin of the hog. Doctor Knorr reported that this particular hog was capable of moving around with the other sows in the group and that nothing unusual was observed regarding the animal on antemortem inspection. This observation was rather interesting in view of the extensive brain lesions subsequently found in the animal. Apparently nothing abnormal was found in the carcass on postmortem inspection, and the lesions described were not discovered until the skull was split, in the usual routine for the removal of the brain. A tentative diagnosis of pyogenic infection was made by the inspector, and the skull containing the brain, still intact, was forwarded to the Pathological Laboratory.

DESCRIPTION OF LESIONS

The gross lesions may be described as a large, encapsulated abscess, or necrotic mass, approximately 3½ inches in diameter, situated near the base of the brain. Pushing up between the hemispheres, which were more or less involved, the abscess formation had caused considerable pressure, as a result of which both hemispheres were considerably thinned or flattened. The grayish necrotic mass was quite soft toward the central portion, with a tendency to become more solid toward the periphery, or just beneath the very heavy capsule.

BACTERIOLOGICAL FINDINGS

While the lesions were not considered particularly suggestive of tuberculosis, in order to eliminate such a possibility a micro-

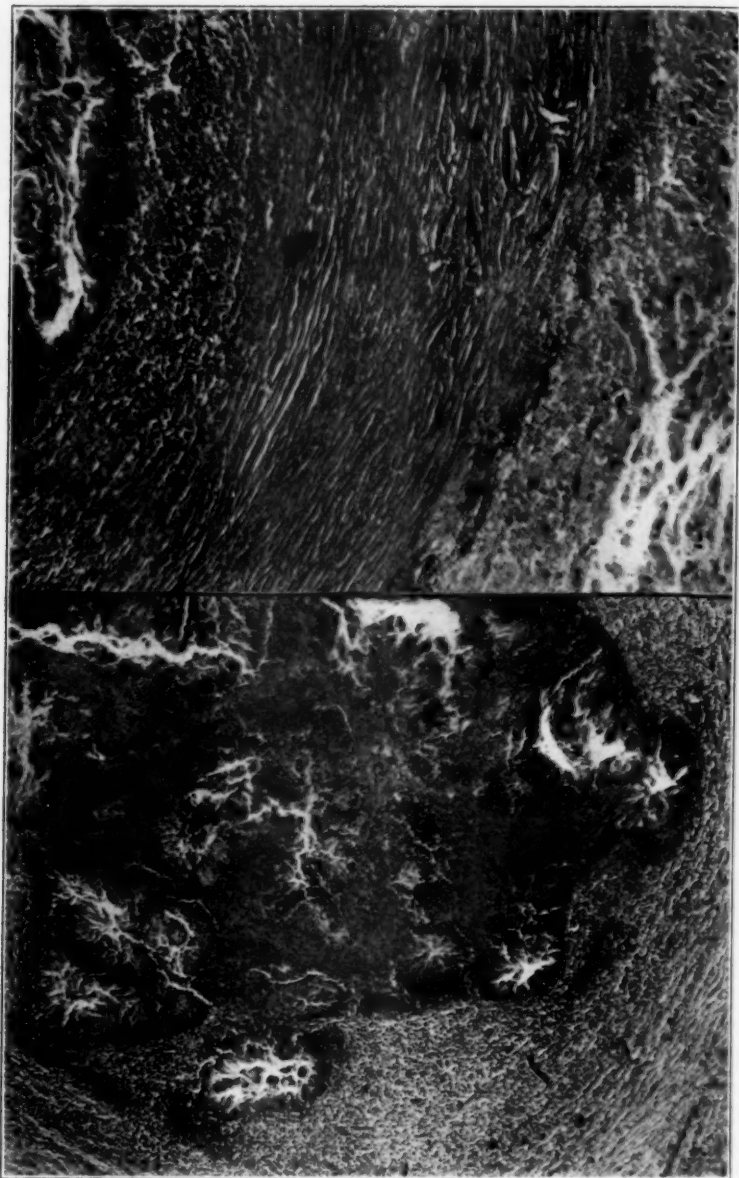


FIG. 1 (above). Photomicrograph showing the heavy fibrous capsule separating the brain tissue from the main lesion (x 70).
FIG. 2 (below). Photomicrograph showing multiple necrotic foci in one portion of the brain lesion (x 50).

scopical examination was made for the possible presence of acid-fast microorganisms, with negative results.

The possibility of *Brucella* infection was kept in mind at the time the lesions were cultured. Cultures were made in standard beef infusion broth, and on serum-agar slants, from various parts of the necrotic lesions. After incubation for 24 hours, there was little definite evidence of growth in the inoculated culture media. After 48 hours, numerous dewdrop-like colonies were discernible on the agar slants and a number of the broth tubes showed more or less cloudiness. Subsequent examinations showed a large percentage of the inoculated tubes to contain pure cultures of an organism which, in its morphological, staining and cultural characteristics, was found to be typical of the *Brucella* group, and which, according to the dye method of *Brucella abortus* differentiation, proved to be of the swine type.

GUINEA PIG INOCULATIONS

The causative organism in this case was found to show the usual virulence of *Br. suis* for guinea pigs. Two guinea pigs, inoculated intraperitoneally with an emulsion of the brain abscess, were dead on the 12th and 13th days, respectively, after inoculation. Abscesses were present in the abdominal cavity, also in the epididymis and testes of both guinea pigs. Pure cultures of the *Brucella* organism were obtained from the lesions in both guinea pigs.

Two guinea pigs also were inoculated intraperitoneally with cultures of the *Brucella* organism obtained from the brain abscess, and both were dead on the 7th and 11th days, respectively, subsequent to inoculations. Both guinea pigs exhibited extreme orchitis, with testicular abscesses; also abdominal abscesses, and evidence of liver involvement in both animals. The guinea pig which succumbed on the 11th day also showed involvement of a number of the ribs, which were greatly enlarged and soft, and from which the *Brucella* organism was recovered in pure cultures. The *Brucella* organism also was recovered in pure cultures from the epididymis, testicle and liver of both guinea pigs.

HISTOPATHOLOGY

The lesions as a whole were walled off from the brain tissue by a very heavy capsule (fig. 1). Sections from the peripheral portion of the large abscess showed numerous small abscesses, or necrotic foci, pushing out from the border of the main lesion (fig. 2). The lesions consisted of both large and small central

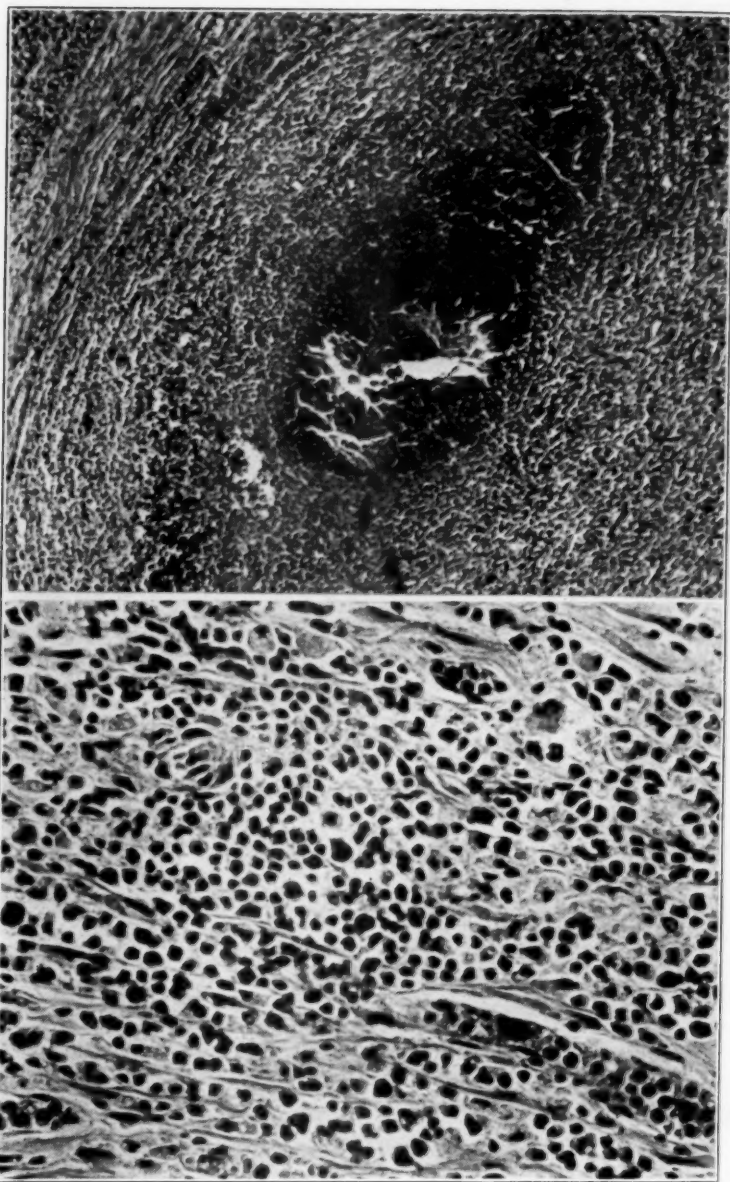


FIG. 3 (above). Photomicrograph showing one of the smaller necrotic centers surrounded by a wide zone of cellular infiltration (x 70).

FIG. 4 (below). Photomicrograph of section from the vascular zone surrounding one of the large necrotic centers showing the eosinophilic infiltration. A very large percentage of the cells seen in the vessels are eosinophiles (x 325).

necrotic masses, surrounded by rather wide vascular zones of cellular infiltration, the whole being heavily encapsulated (fig. 3). In the cellular zones, there were diffuse infiltrations of fibroblasts, lymphoid and mononuclear cells, the latter varying considerably in size, and a limited number of epithelioid cells. An interesting feature of the lesions was the rather large number of eosinophiles present, some of which were intermixed with the invading cells, but even larger numbers of which could be seen in the small vessels near the borders of the necrotic centers (fig. 4). Large masses of partially degenerated and disintegrated eosinophiles also could be seen scattered through the larger necrotic areas. While making no attempt at this time to interpret the significance of the large number of eosinophile cells in such cases, the writer desires to call attention to the fact that this is the third case of brucellosis in swine in which this interesting observation has been made. In some of the necrotic areas there were indications of slight calcification. Taking into consideration the different types of tissues involved, there was considerable similarity in the histological findings in this case and in another case of brucellosis of swine previously reported by the writer.³

The very unusual location of the lesions in this case would seem to indicate that *Br. suis* may invade and produce lesions in most any tissue of the body of the pig. It also indicated that there is considerable yet to be learned regarding the pathology of brucellosis of swine; and, as more is learned regarding the pathology of the disease, it assumes more importance from a meat inspection standpoint.

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MICROFILARIA IN A DUCK*

By F. R. BEAUDETTE, *New Brunswick, N. J.*
New Jersey Agricultural Experiment Station

Two rather badly decomposed ducks were received in January through the courtesy of Mr. A. M. Bartley. The ducks bore Biological Survey band numbers 35-504304 and 35-504229, respectively, and came from a refuge established by the South-

*Received for publication, July 3, 1936.

ampton Township Wildfowl Association at East Quoque, L. I. The letter of transmittal stated that the birds had access to open water, and that some of them got thin and died.

Decomposition was too advanced to note any changes that may have been present, however, blood smears were made and stained with Wright's stain. Bird 35-504304 was found to be heavily infested with sheathed microfilaria, and the other bird showed none. The adults were not found.

Torrey, Thorp and Graham¹ have reported finding eight ducks infested with microfilaria out of 15 examined in Illinois.

This report is made to encourage the blood examination of wild birds. Very likely blood parasites are far more numerous than might be expected.

REFERENCE

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TREMBLING IN PIGS*

By ARTHUR J. KNILANS, *Janesville, Wis.*

On May 15, I was called to a farm to see a lot of pigs that were described by the owner as having the "shakes." The history as given by the owner, who was with every sow when she farrowed, covers the case very well.

Five litters out of twelve were affected. Pigs were shaky when born and became steadily worse for the first few days. About 40 per cent of the pigs in the five litters were affected. The balance of the pigs in those litters were normal in every way.

The seven other litters sired by another boar were perfectly normal. The dams were all related and, of two sows that were litter-mates, one produced "shakey" pigs while the other had normal pigs. Later on two sows farrowed "shakey" pigs sired by the second boar.

The "shakey" or dancing pigs were of fair size at birth, fed well, and developed like the others. The best pig in the entire lot of about 100 was one of a litter of five that shook so hard that I could not see how he was able to nurse.

FEED

The sows were well fed with ground grain, dairy by-products, tankage and oil meal. Exercise was curtailed during early pregnancy by the unusually deep snow and extreme cold of last winter.

*Received for publication, August 6, 1936.

Their condition at farrowing time was good and they all produced plenty of milk. Litters ran from five to 14 pigs, several farrowing from ten to twelve pigs. Loss of pigs was small, as the equipment was good and the owner was a good care-taker.

DIAGNOSIS

The condition was new to me and a diagnosis was not made. Two pigs sent to the Wisconsin Experiment Station at about two weeks of age were given anti-hog cholera serum to protect them. One stopped shaking almost at once. One continued for several weeks.

Prof. J. M. Fargo, of the University of Wisconsin, reported that a number of pigs raised at the station in 1935 showed a similar condition. It was thought to be caused by excessive feeding of skim milk (20 pounds per sow daily). They tried to reproduce the condition by feeding 30 pounds of skim milk daily and secured a crop of normal pigs.

TREATMENT

The sows and pigs were turned into a clover pasture and fed as usual. All pigs soon became normal and at the present writing they appear to be normal in every way. Gains have been good and no losses have occurred.

Question—What caused the condition?

COXO-FEMORAL LUXATION IN A DOG, WITH PERMANENT RETENTION AFTER REDUCTION*

By H. D. PRITCHETT, Philadelphia, Pa.

Luxation of the hip joint in the dog as a result of traumatic violence is of frequent occurrence, and is commonly observed in a city practice, especially in the more congested traffic areas. This, however, is not always the rule, since the rural or small-town dog seems to present just as good a target for the motorist as does his city-bred-and-trained mate. The degree of accuracy with which the careless motorist can strike is appalling, to say the least, and such accidents are often absolutely unavoidable, "yet he who is without sin let him cast the first stone."

The object of this report is to present to the reader the record of an actual case which was treated by the writer. Since there is such a great difference of opinion regarding treatment of this

*Received for publication, August 25, 1936.

condition, it is hoped that a record of the treatment applied to this particular case, and the accompanying circumstances, may be of some value.

The case in question was an English setter, male, age 14 months, and in poor condition, but nevertheless a valuable animal, according to the owner. This animal was struck by an automobile traveling at high speed and "thrown some distance," as stated by competent witnesses. It seems incredible, the degree of shock that a dog can survive! He was seen to "limp away, dragging one hind leg," and in spite of reasonable efforts on the part of the owner the dog could not be found. Since this occurred in a small country town surrounded by woodland, it is easy to understand how this dog could disappear so quickly. It is also a well-known fact that injured or sick dogs will usually attempt to hide themselves away while nature affects healing, or to seek relief in death. Five days later, the dog was found by some children while playing in the nearby woods. In consideration of the facts stated above, it seems reasonable to assume that this dog suffered the dislocation at the time he was struck, and the exposure would easily account for the poor condition when presented for treatment.

Clinical examination of the dog very clearly and definitely revealed the luxation, but no marks of external traumatism could be seen, nor was there evidence of any consequential internal injury. Especially was there no evidence of any present or recent internal hemorrhage, and nothing to indicate the existence of a fracture of any type. Any degree of traumatic shock, which may or may not have existed, was not observed at the time of examination. The lapse of five days between occurrence and reduction would account for this. There was no response to a pin-prick of the skin over the great muscles, articulations, or between the digits. The dog did, however, evince pain when the slightest traction or rotation was applied to the affected limb. This almost complete loss of sensation could hardly be attributed to spinal involvement, since the corresponding limb was entirely normal in function, and there were no symptoms manifested either before treatment or after recovery that could lead one to suspect either spinal or cranial injury. However, permanent or temporary paralysis is frequently observed in these cases.

The functions of the pelvic, abdominal and thoracic organs were also entirely normal. The limb was cold to the touch, and swelling was completely absent. This would seem to indicate arterial pressure in the pelvic region, with impaired arterial circulation rather than a venous block. As further evidence, the

spasmodic muscular contractions which commonly occur during the induction of ether anesthesia did not occur in the affected limb as it did in the others. As reduction was effected under ether anesthesia, this was actually observed. Since on recovery the dog had complete function of the leg that had been reduced, it would be in keeping with the foregoing observations to conclude that temporary pressure upon, or tension of, the nerve supply to this leg existed, due to the malposition of the component parts of the acetabulum.

Precisely, the position and the extent of the luxation were as follows: There was upward thrusting of the shaft of the femur, with considerable dorsal displacement and forward rotation of the head and neck. The head of the femur, as the above-described position would indicate, was lifted over the superior spine and lodged on the visceral side of the acetabulum, being retained there by the neck; consequently the limb was in a position of extreme adduction. As the patient was a young animal, the possibilities of a green-stick fracture or the existence of an obscure fracture of the pelvis, which may not be discernible clinically, were given due consideration. To confirm the clinical diagnosis, and to locate such possible fractures, an X-ray plate was made. This procedure should always be carried out in such cases, as it is quite possible to complete mechanically a green-stick or an incomplete fracture during the requisite manipulations in affecting reduction. The plate confirmed the diagnosis, and clearly showed no extensive injury to the lips of the acetabulum, which is a common sequel of such a dislocation. Traumatism of the capsular and round ligaments was not apparent.

As stated, reduction was obtained under general ether anesthesia. Since the technic of reduction differs with each individual case, no effort will be made to describe the method employed here. However, once reduction is attempted, it should be completed with all expediency and with as little trauma to the surrounding parts as possible. A very free-fitting cast was applied to immobilize the joint, completely encasing the pelvis and limb to be restrained. A thick cotton pad was laid over the trochanter on either side, and a cast built up from before the pelvic inlet to the base of the tail, continuing down the leg, gradually becoming thinner as the foot was reached, which was also incased. No attempt was made to apply a fracture cast, the object being merely to restrain extension and flexion, and to aid in supporting the body weight, yet permit natural tonic contractions of the muscles within the cast. With this cast, fixation was entirely satisfactory. It was intended that the cast

should remain in place for 21 days, but on the 14th day, due to its light construction and the activity of the dog, it was broken and had to be removed completely. As the dog had almost complete use of the limb, the cast was not replaced.

The dog was permitted free exercise in a small enclosure with a level floor, but was restrained in no way, as pulling on a leash or jumping from different floor levels would have exerted undue strain and tended to produce a recurrence. It is quite possible that faulty post-operative care is the cause of failure to obtain permanent retention in many such cases. After about two weeks of exercise under such conditions, the dog was taken for short walks on a leash, the attendant taking care not to permit unnecessary exertion, jumping over obstacles such as steps, or any action requiring excessive use of the hind legs. All during the convalescent period a strict, nourishing diet containing cod-liver oil, fresh meat and occasionally milk was adhered to.

This patient was again observed four months later and was found to be in perfect physical condition. The leg functioned as efficiently as its fellow, and there appeared to be no reason to expect a recurrence under normal conditions.

No doubt the reader will call to mind several of the many forms of suggested treatments for this type of luxation, but the writer believes the described method in accordance with good surgical procedure, and it would therefore seem to be worthy of consideration before resorting to open reduction, which in many cases is not indicated. Depending on the natural formation of a false joint and ankylosis for healing, instead of mechanical reduction, would not appear to be justifiable as often as it is resorted to.

Hospital Information Wanted

Do you own or operate a veterinary hospital? We are compiling a list of the veterinary hospitals in the United States and Canada. We want the list as complete and accurate as it is possible to get it and your help is asked. Just send to the Secretary of the A.V.M.A. one of your letterheads, showing the name and location of your hospital. If your hospital has no name, other than your own, send one of your letterheads just the same. Then add the following information in either case: Indicate capacity for large animals; for small animals. State whether the hospital was built as such or whether it is a remodeled building. Do you own, rent, or operate on contract?



ABSTRACTS

THE EFFECT OF PROLONGED APPLICATION OF FOLLICULAR HORMONE ON THE UTERUS OF RABBITS. Bernhard Zondek. Jour. Exp. Med., lxiii (1936), p. 789.

Follicular hormone under physiological conditions produced hyperplasia of the muscular wall and proliferation of the mucous membrane of the uterus of rabbits. Prolonged application of large doses of the hormone brought about the following changes: (1) hyperemia of the myometrium and the endometrium, with occasional scanty extravasal hemorrhage; (2) glandular cystic hyperplasia of the endometrium; (3) infarct-like necrosis of the myometrium; (4) aseptic suppuration in the uterine cavity. These four processes are sometimes found in the same uterus, but they occur more frequently in sequence. While follicular hormone applied in physiological doses has a stimulating effect, prolonged application of large doses destroys the uterus. These effects are observed in the rabbit and not in the rat, which indicates that hormone reactions may differ in the various species.

EXPERIMENTAL ENCEPHALITIS (SAINT LOUIS TYPE) IN MICE WITH HIGH INBORN RESISTANCE. A chronic subclinical infection. Leslie T. Webster and Anna D. Clow. Jour. Exp. Med., lxiii (1936), p. 827.

Saint Louis encephalitis virus injected intracerebrally or intraperitoneally in maximum doses in resistant mice is distributed and is effective in a manner generally similar to that in susceptible mice. The minimum infecting dose is at least 1,000 times greater in resistant than in susceptible mice and virus injected in the brain tends to remain at a relatively low titre, persist for a few days, and then disappear. Virus dropped in the nares is demonstrable and progresses in brains of resistant mice as in susceptible mice but does not increase in titre beyond the fifth day, does not bring about fatal encephalitis, and persists for at least four weeks. Lesions in the brains of resistant mice, following nasal instillation of virus, do not appear until the eighth day,

reach a maximum at 40 days, and are still present at three months. The changes resemble those seen in the human disease and in other unnamed forms of encephalitis. The quantity of virus drops 1,000 fold when recovered from resistant mice and becomes non-infective by the nasal route. Passage in susceptible mice promptly restores its full titre.

PERSISTENCE OF LYMPHOCYTIC CHORIOMENINGITIS VIRUS IN IMMUNE ANIMALS AND ITS RELATION TO IMMUNITY. Erich Traub. *Jour. Exp. Med.*, lxiii (1936), p. 847.

In some apparently healthy mice the virus of lymphocytic choriomeningitis persisted for a considerable time after recovery, in the blood, urine and nasal secretions, while in other mice it soon became undemonstrable. It is possible that the persistence of the virus is due to lesions in the lungs, liver and kidneys. The immunity to lymphocytic choriomeningitis in mice does not seem to depend upon the presence of virus in the blood and the organs tested. No antiviral was detected in sera from several solidly immune mice, which fact suggests that circulating antiviral plays no important part in their immunity. Leukocytes also seem to be no essential factor in this immunity, which probably is closely linked with the tissues. The urine of guinea pigs which had recovered from severe attacks of lymphocytic choriomeningitis contained virus for a few weeks after recovery, while that from mild cases contained no virus. Virus was never demonstrated in the blood of immune guinea pigs. Antiviral was readily detected in it.

THE PROTECTIVE ACTION OF NASALLY INSTILLED IMMUNE SERUM AGAINST INFECTION WITH CERTAIN NEUROTROPIC VIRUSES BY WAY OF THE NOSE. Albert B. Sabin. *Jour. Exp. Med.*, lxiii (1936), p. 863.

Immune serum instilled intranasally in guinea pigs has protected them from infection with lethal amounts of pseudorabies virus by the nasal route. The same effect was obtained in mice with immune serum against the virus of equine encephalitis (Eastern strain). The protective effect of the immune serum in the nose begins at the time of the instillation, is still evident five hours later, and usually has disappeared by the end of 24 hours. Attempts to prolong the local effectiveness of immune serum by means of several devices were unsuccessful. The action of the immune serum appears to be a local one in the nose, in

view of the fact that the administration of even larger amounts of it intramuscularly failed to protect guinea pigs against infection with pseudorabies by the nasal route.

ACTIVE IMMUNIZATION OF GUINEA PIGS WITH THE VIRUS OF EQUINE ENCEPHALOMYELITIS. III. Quantitative studies of serum antiviral bodies in animals immunized with active and inactive virus. Herald R. Cox and Peter Olitsky. Jour. Exp. Med., lxiv (1936), p. 217.

Guinea pigs injected with amounts of active equine encephalomyelitis virus inadequate to induce protection against an intracerebral test of 1,000 or more m. l. d. of virus show no significant humoral antiviral bodies. The latter, however, are regularly present in immune animals and are best demonstrated by adding serum to low multiples of infective doses of virus under optimal conditions of time and temperature (2.5 hours and 37 C.). Guinea pigs immunized either with active or with inactive formolized virus reveal no distinctive differences in the antiviral content of their sera.

ON THE MECHANISM OF IMMUNITY IN TUBERCULOSIS. The host-parasite relationship under the conditions of a localized agar focus of infection and the generalization of the disease in normal and immunized rabbits. Max B. Lurie. Jour. Exp. Med., lxiii (1936), p. 923.

There is an extravascular factor which inhibits the growth of tubercle bacilli in immunized rabbits. Extracellular factors localize carbon particles, trypan blue and tubercle bacilli at the site of introduction to a greater extent in the immunized animal than in the normal animal. This greater fixation is brought about by an increase in the density and the extent of the fibrin barrier found about the focus of the immunized animal. The more pronounced *in vivo* agglutination of tubercle bacilli and carbon particles in the vaccinated or tuberculous rabbit also tends to immobilize them in the tissues. The growth-inhibitory and localizing agents are effective in the fixation of small doses on reinfection at the portal of entry. With larger doses on reinfection, the increased lymph flow resulting from the intensified inflammation in the immunized animal brings about a more rapid dissemination of the bacilli to the draining lymph-nodes than in the normal animal. The most significant factor in immunity is the increased capacity of the rapidly mobilized mononuclear phago-

cytes to destroy tubercle bacilli. The impotent polymorphonuclear leukocytes quickly disappear from the site of injection. The invading bacilli that reach the draining lymph-nodes of the immunized animal are retarded in multiplication or destroyed by these phagocytes. Vaccination of rabbits with *B.C.G.* brings into play the factors tending to immobilize the bacilli of reinfection, inhibit their growth and destroy them with a significant immunity. A virulent primary infection affords a greater immunity than one of low virulence and the host reactions are expressed by a quantitative increase in those immunity factors which operate in a vaccinated animal.

OBSERVATIONS ON THE EFFECT OF LOUPING-ILL VIRUS ON THE DEVELOPING EGG. F. M. Burnet. Brit. Jour. Exp. Path., xvii (1936), p. 294.

Louping-ill virus may be propagated in the developing hen's egg, producing both local chorio-allantoic membrane lesions and general effects upon the embryo. The number of focal lesions can be used as a sensitive but rather inaccurate indicator of the presence and amount of virus. Serum neutralization tests can be carried out with the egg membrane as the indicator organism, the results agreeing fairly closely with those obtained by the method of intracerebral inoculation in mice. Virus is constantly in the circulating blood, is in part at least attached to the blood-cells and is liberated from this attachment by the action of distilled water. The lesions observed in the embryo are such as might be accounted for if the primary effect of this virus is to produce hemolytic anemia with or without primary damage to liver cells. The almost exclusive viscerotropism of louping-ill virus in this situation is discussed.

THE IMMUNOLOGICAL RELATIONSHIP BETWEEN KIKUTH'S CANARY VIRUS AND FOWL POX. F. M. Burnet and Dora Lush. Brit. Jour. Exp. Path., xvii (1936), p. 302.

The viruses of infectious laryngotracheitis, ectromelia and vaccinia can be effectively titrated on the chorio-allantoic membrane. The authors indicate that bird-pox viruses can be titrated in the same way, by the pock-counting method on the chorio-allantoic membrane. Cross-neutralization tests of Kikuth's canary virus and that of fowl-pox indicate that the two viruses, though not identical, are serologically very closely related. There is no cross-

reaction with vaccinia virus. It is likely that all bird-pox strains are similarly related. The advantages of having a common susceptible organism for pox viruses facilitates the study of these agents.

INFLUENCE OF LIGHT ON OVULATION IN THE FOWL. D. C. Warren and H. M. Scott. Jour. Exp. Zool., lxxiv (1936), p. 137.

Under normal lighting conditions, the onset of darkness seems to be a factor in termination of the clutch of eggs and the consequent restriction of egg-laying in the hen to the daylight period. Experimental variations in lighting conditions showed that hens would lay at any hour of the day (24 hours) under continuous artificial lights and would lay only at night under reversal of daylight and darkness. Some interruptions seem to be due to delays in ovulation occurring independently of the light factor. The changes in lighting conditions were not reflected immediately in the birds' laying reaction but required about 60 hours to have their effect. This indicates that the influence of light in regulating laying occurred before ovulation.

EFFECTIVENESS OF HOT HYPOCHLORITES OF LOW ALKALINITY IN DESTROYING MYCOBACTERIUM TUBERCULOSIS. S. M. Costigan. Jour. Bact., xxxii (1936), p. 57.

Heating suspensions of *Mycobacterium tuberculosis* (human strain) to 60° C. for 5 minutes does not destroy the organism. The hypochlorite solution of low alkalinity containing 50 parts of available chlorine per million parts of water heated to 50° C. destroys *M. tuberculosis* in 2½ minutes; heated to 55° C., it destroys it in 1 minute, and heated to 60° C., it destroys it in ½ minute. The hypochlorite solution of low alkalinity, containing 200 parts of available chlorine per million parts of water, heated to 50° C., destroys *M. tuberculosis* in 1 minute; heated to 55° C. and 60° C., it destroys it in ½ minute.

CLOSTRIDIUM BOTULINUM TYPE C IN RELATION TO DUCK SICKNESS IN THE PROVINCE OF ALBERTA. R. M. Shaw and Gretta S. Simpson. Jour. Bact., xxxii (1936), p. 79.

Clostridium botulinum type C was isolated in pure culture from the organs of a duck dead of duck sickness. Antitoxin produced against the toxin of this freshly isolated strain protected test

birds against homologous toxin and against that of a known culture of *C. botulinum* type C. The use of this antitoxin in toxin-antitoxin protection experiments enabled the authors to demonstrate the presence of *C. botulinum* type C in the bodies of six other waterfowl and in cultures of mud from the epizootic area. Examinations of the heart-blood from some ducks before or shortly after death revealed large numbers of filarial worms which were regarded as being of little significance in the epizootic.

THE PHENOL COEFFICIENT AS A MEASURE OF THE PRACTICAL VALUE OF DISINFECTANTS. J. C. Varley and G. F. Reddish. Jour. Bact., xxxii (1936), p. 215.

Coal tar disinfectants and cresylic acid disinfectants diluted to 20 times their phenol coefficient are effective in killing representative pathogenic microorganisms under practical conditions of use. Disinfectants of various strengths, whether they have a high or low phenol coefficient, have the same germicidal activity and are equally effective under practical conditions when diluted to 20 times their respective phenol coefficients. Disinfectant solutions made up to 20 times their phenol coefficient are capable of killing large numbers of pathogenic microorganisms under practical conditions. When dilutions are made on this basis, coal tar disinfectants and cresylic acid disinfectants should be equally germicidal; phenol-like disinfectants diluted in this way are as effective as 5 per cent carbolic acid.

Erratum

In the abstract of the article, "The Blood pH of Leukotic Fowls and the Filterability of the Leukosis Agent," by E. P. Johnson and W. B. Bell, which was published in the August issue of the JOURNAL, page 227, there was an error in reporting the results of filtration experiments. The statement should have read somewhat as follows: "It was found that the causative agent of the various forms of leukosis is filtrable through membranes that retain *Salmonella pullorum*, which has dimensions of 1,000 to 1,500 millimicrons."

A. A. A. S.

The One Hundredth Meeting of the American Association for the Advancement of Science will be held in Denver, Colorado, June 21 to 27, 1937, with both the Pacific and Southwestern divisions participating.



Regular Army

The promotion of each of the following-named captains, Veterinary Corps, to the grade of major, with rank from August 29, 1936, is announced:

Herbert M. Cox
Laurence R. Bower

Captain Austin T. Getz is relieved from his present assignment and duty at Langley Field, Va., effective upon the arrival of Major Nathan M. Neate, V. C., and will proceed to New York, N. Y., and report to the commanding general, N. Y. Port of Embarkation, for temporary duty until such time as will enable him to sail on the transport scheduled to leave that port on or about December 16, 1936, for San Francisco, Calif. Upon arrival in San Francisco will report to the commanding general, Ninth Corps Area, for temporary duty at Fort Mason, Calif., until such time as will enable him to sail on the transport scheduled to leave San Francisco on or about February 2, 1937, for the Philippine Department, and upon arrival in that department will report to the commanding general for duty with the Veterinary Corps.

1st Lieut. Walter T. Carl is relieved from further assignment and duty at the N. Y. Port of Embarkation, Brooklyn, N. Y., effective on or about September 25, 1936, and will then proceed to Fort Hoyle, Md., for duty.

Captain Richard G. Yule is relieved from duty at Fort Myer, Va., effective on or about October 15, 1936, will then proceed to Fort Moultrie, S. C., and report to the commanding officer for duty, and in addition will act as attending veterinarian at Fort Screven, Ga.

So much of par. 30, S.O., 166 W.D., 1936, as assigns Major Irby R. Pollard, V.C., to duty at Fort Benjamin Harrison, Ind., is amended so as to assign him to duty at Fort Clark, Tex., effective upon completion of his present tour of foreign service.

The following-named officers of the Veterinary Corps are directed to report to the commandant, Medical Field Service School, Carlisle Barracks, Pa., on or about October 10, 1936, for temporary duty, for the purpose of pursuing the advanced course of instruction. Upon completion of same, about December 19, 1936, to return to their proper station.

Major Seth C. Dildine, N. Y. Port of Embarkation, Brooklyn, N. Y.
Major Joseph F. Crosby, Fort Devens, Mass.
Major Kenneth E. Buffin, Carlisle Bks., Pa.

Veterinary Reserve Corps

NEW ACCEPTANCES

Kingdon, Earl Goss.....1st Lt...524 First Ave., Salt Lake City,
Utah.
Smith, Ivan1st Lt...R. 5, South Omaha, Neb.
Tamoglia, Thomas William.1st Lt...1175 S. Grant St., Denver, Colo.
Winsor, Frank Reed.....1st Lt...9 Prospect St., Montgomery, Ala.

PROMOTIONS

To

Anderson, Robert Jewell....1st Lt...R. 3, Marshall, Tex.
 Ballenger, Ottis Elmo.....1st Lt...Box 119, Eastanollee, Ga.
 Boardman, William1st Lt...Sheffield, Mass.
 Grossman, George Dewey...1st Lt...Gambier, Ohio.
 Horning, Jackson Gilbert...Major...3611 Willia St., Houston, Tex.
 Kenaston, Glenn Harry....1st Lt...2600 S. El Camino Real, San Mateo, Calif.
 Knisely, Burnell Edison....1st Lt...R. 1, Crestline, Ohio.
 White, Alfred Everett Jr...1st Lt...1743 Fairchild Ave., Manhattan, Kan.

NEW ASSIGNMENTS TO ACTIVE DUTY WITH CCC

Henkel, Ernest L.....1st Lt...Pres. of San Francisco, Calif.

TERMINATION OF ASSIGNMENT TO ACTIVE DUTY

Anderson, Horace Leslie....Capt...Fort Des Moines, Iowa.

BUREAU TRANSFERS

DR. HIRAM L. WINDER (Chi. '13), from Chicago, Ill., to Elburn, Ill., in charge of meat inspection.

DR. B. H. MOON (A. P. I. '11), from Birmingham, Ala., to Ottumwa, Iowa, on meat inspection.

DR. J. O. WILSON (O. S. U. '08), from Lincoln, Neb., to Clifton, N. J., in charge of B. A. I. quarantine station.

DR. G. W. CRONEN (K. S. C. '14), from Pierre, S. Dak., to Helena, Mont., in charge of tuberculosis eradication.

DR. J. W. MURDOCK (K. C. V. C. '11), from Helena, Mont., to Lincoln, Neb., in charge of tuberculosis eradication.

DR. E. F. CARY (K. C. V. C. '09), from Wichita, Kan., to Tacoma, Wash., in charge of meat inspection.

DR. A. N. MCGREGOR (Colo. '13), from Tacoma, Wash., to Los Angeles, Calif., in charge of meat inspection.

DR. J. A. PATTON (St. Jos. '14), from Duluth, Minn., to Ottumwa, Iowa, in charge of meat inspection.

DR. S. F. GRIESEMER (U. P. '09), from New York, N. Y., to Duluth, Minn., in charge of meat inspection.

DR. D. B. PELLETTE (K. S. C. '12), from Jacksonville, Fla., to Oklahoma City, Okla., on tuberculosis eradication.

DR. CHARLES WEBSTER (Colo. '14), from Montrose, Colo., to Garden City, Kan., on tuberculosis eradication.

DR. J. W. WOODS (K. S. C. '14), from Lake Wales, Fla., to Washington, N. C., on Bang's disease eradication.

DR. GEORGE W. HESS (T. H. '18), from New York, N. Y., to Sioux Falls, S. Dak., Packers and Stockyards Division.

DR. R. J. W. BRIGGS (Chi. '02), from Fremont, Neb., to Ottawa, Ill., on avian tuberculosis eradication.

DR. F. W. CRAWFORD (K. S. C. '23), from South Saint Paul, Minn., to Sioux Falls, S. Dak., in charge of meat inspection.

DR. CESAR CLAVELL (Tex. '35), from San Juan, Puerto Rico, to Chicago, Ill., on meat inspection.

MISCELLANEOUS



Violator of Minnesota Veterinary Practice Act Successfully Prosecuted

Upon complaints of several farmers in the vicinity of Glencoe, McLeod County, Minnesota, the Practice and Ethics Committee of the Minnesota State Veterinary Medical Society investigated the illegal veterinary practice of one Theodore F. Leuck and found that this person had practiced veterinary medicine illegally for 18 years and had stated that he intended to continue doing so and challenged any one to stop him. Several farmers were found who were willing to appear on the witness stand, declaring that this Theodore F. Leuck demanded a fee in money for his services and that he also held out that he was competent to practice veterinary medicine.

The attorney of the Society, Mr. Knute D. Stalland, of Saint Paul, Minnesota, represented the veterinary profession. On June 29, 1936, the District Court of McLeod County made its order permanently restraining one Theodore F. Leuck from practicing veterinary medicine in the state of Minnesota. Ten days previously, the Court had issued a temporary injunction and set the hearing on the permanent injunction for June 29, at Glencoe. The action was brought by Drs. A. C. Spannaus and E. H. Gloss as plaintiffs. Dr. Spannaus is the chairman of the Practice and Ethics Committee of the Minnesota State Veterinary Medical Society and Dr. Gloss is a member of the same committee.

During the course of the hearing, at which about 250 farmers from the surrounding territory made their appearance, Leuck testified that he had practiced veterinary medicine in and about McLeod County for a period of 18 years. He denied, however, that he had made a charge for this service in the nature of a fee, but admitted that he had received money for performing veterinary services, and in two specific cases admitted that he, when asked by the client what his charge would be, stated that it would be \$3.00, and received and accepted such sum. One of the specific cases of unlawful practice, alleged in the complaint

of the plaintiffs, was the service rendered by Mr. Leuck during the birth of a calf, and the other involved his services in the premature birth of a colt.

The courts have generally held that a license to practice a skilled profession is a property right, and that such a property right may be protected by injunction where there is an infringement by one who is not licensed, and one or more members of the profession may sue to restrain, in behalf of all the members of the profession.

This is the second time that an unlicensed practitioner has been enjoined from such unlawful practice in Minnesota. In the first case, an injunction was issued by the District Court of Dakota County against a large corporation, and an individual veterinarian whom it employed to test cattle for contagious and infectious diseases. In both of these cases the offending party has been compelled to pay the court costs of the injunction proceedings.

C. P. F.

Wisconsin Conservation Department Laboratory Activities

Since the establishment of the State Game and Experimental Fur Farm near Poynette, Wisconsin, in July, 1934, the diagnostic laboratory with its extension service to fur-growers has been one of the busiest units of the Conservation Department.

From July 1, 1934, to June 30, 1936, a total of 10,791 cases have been handled by the Department Veterinarian, Dr. Earl F. Graves. Approximately 47,000 miles were covered in line of duty. Twelve meetings were held with groups of fur-farmers and sportsmen and three radio talks were given.

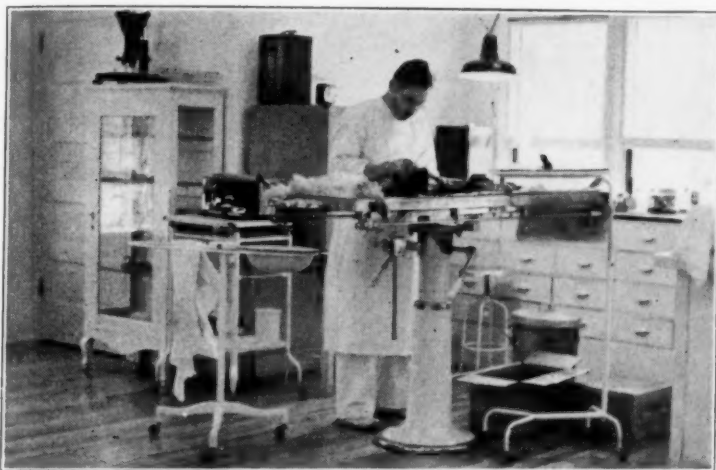
Sick and dead animals and game birds are sent to the laboratory for inquiry into cause of death. Owners are informed of the pathologist's findings, together with recommendations for improving conditions at the ranch or farm. When necessary, in Wisconsin, Doctor Graves calls directly at fur-farms to assist and instruct in fur-animal husbandry.

The laboratory has taken the guesswork out of fur-farming and has demonstrated that no single disease is taking large tolls from Wisconsin wildlife. In view of the very poor physical condition of deer bodies sent in for study and autopsy during the winter months, Doctor Graves has suggested the use of grain concentrates for winter deer-feeding in place of hay only. Plans

have been made for some studies into certain animal parasites.

Help has been rendered to fur-growers in 27 states and Alaska. It is felt by the Conservation Department that the laboratory has been very successful. Whenever possible, Doctor Graves works with the private practitioner. A hearty invitation is extended to all veterinarians and fur- and game-breeders to make use of the Wisconsin Conservation Department's laboratory at Poynette. There is no charge made for the services rendered. The entire and only wish is to boost the fur-farming industry, whether it be in Wisconsin or elsewhere.

The accompanying photograph shows an interior view of the laboratory.



DIAGNOSTIC LABORATORY OF WISCONSIN CONSERVATION DEPARTMENT
AT POYNETTE

Hoosier Veterinarians in Accident

There always must be a first. Dr. J. L. Axby, state veterinarian of Indiana, has driven automobiles since 1910, and up to January 1, 1936, he had driven more than 1,340,000 miles without a serious accident. On September 18, he was driving from Indianapolis to Washington, Ind., to attend a meeting of the Indiana-Illinois Veterinary Medical Association, accompanied by Dr. Herman Busman, B. A. I. inspector-in-charge of tuberculosis eradication in Indiana. Near Shoals, on U. S. 50, a large truck crowded Dr. Axby's car off the road into the ditch. Dr. Axby miraculously escaped with a few scratches and bruises. Dr. Busman suffered an injury to one ankle, which turned out to be a fracture of the fibula. He was confined to his bed almost a

month. The car was so badly damaged that the insurance company decided to buy Dr. Axby a new one.

An Unusual Family

Among the unusual exhibits at the recent A. V. M. A. convention in Columbus was "Lady," of Indianapolis. She had Dr. F. H. Brown, of that city, to thank for her trip to the convention. She was accompanied by her two foster children, as well as two of her very own. Now "Lady" is just a four-year-old ter-



LADY AND HER FAMILY

rier of rather uncertain ancestry, whose home is on a farm near Indianapolis. About the middle of July she gave birth to two puppies. About the same time a sow gave birth to nine piggies. Two were brought to the house to be bottle-fed. One day they nosed out of their pen and joined Lady's pups at lunch on the back porch. Lady adopted them, with the result that Dr. Brown thought she had earned a trip to the convention. The accompanying photograph shows Lady, her twin offspring and the Poland-China twins. The meal in progress was served in a suite at the Deshler-Wallick, where Lady and her family were registered.

COMMUNICATION

THIRTEENTH INTERNATIONAL VETERINARY CONGRESS IN SWITZERLAND

TO THE EDITOR:

At the request of Prof. Dr. G. Flückiger, president of the Organizing Committee of the Thirteenth International Veterinary Congress, which will meet in Switzerland in 1938, I had the pleasure of visiting Bern in August, and contacting a number of the members of the Swiss Organizing Committee, and also some of the members of the Permanent Committee. It has been the desire of the Organizing Committee to have the structure of the forthcoming Congress set up this year and not wait until next May to begin this work, as has been the customary procedure in the past. As a result, plans have already been formulated to hold the sessions for the first five days in Zurich, then proceeding by special government train to Bern on the sixth day, and thence to Interlaken for the remaining two days, when Congress will be brought to a close.

Through the courtesy of the Minister of Agriculture and Dr. Flückiger, official automobiles were furnished to cover this route in order that we might be able to visualize the wonderful Alpine scenery that would be enjoyed by those attending the Congress, to visit some of the largest stock farms en route, and also to note the relative time required to make such a schedule.

The following tentative program has been under consideration:

A. GENERAL SESSIONS:

1. Veterinary education under modern demands.
2. General conditions under which infectious diseases develop.
3. Disturbances of reproduction.

B. SECTIONAL MEETINGS:

Section I. Internal medicine and surgery:

1. Recent progress in the field of hematology as applied to animal diseases.
2. Recent investigations on forage poisoning.
3. Recurrent ophthalmia.
4. Present status of the use of anesthesia.

Section II. Infectious diseases:

1. The rôle of the tuberculin test in the control of tuberculosis.
2. Aujeszky's disease.
3. Influenza of swine.
4. Control of animal salmonellosis.

Section III. Diseases of cattle:

1. Malignant catarrhal fever and related diseases.
2. Leukosis of cattle.
3. Recent investigations on specific infections of the genital system of cattle.
4. Surgical demonstrations on cattle.

Section IV. Parasitology and parasitic diseases:

1. Animal parasites of game.
2. Relationship between parasitic diseases of man and animals.
3. Pasture hygiene in relation to parasitic diseases.
4. Immunity and immunological reactions in parasitic diseases.

Section V. Tropical diseases:

1. Recent investigations of tropical and subtropical diseases.
2. Geographic distribution of tropical diseases.

Section VI. Diseases of poultry:

1. Lymphomatosis.
2. Blackhead.
3. Coccidiosis.
4. Psittacosis.

Section VII. Zootechnics:

1. Growth and early sexual maturity.
2. Constitution of domestic animals from the anatomical, physiological and hygienic points of view, and their connection with reproduction.
3. Influence of climate on the constitution, capacity for resistance and reproduction of domestic animals. Acclimatization.

Section VIII. Meat inspection and milk hygiene:

1. Judging of tuberculous carcasses.
2. Bacterial, non-bacterial, physical and chemical changes in meat.
3. Milk hygiene.
4. Modern stunning methods in the slaughter of animals.

Section IX. Military veterinary science:

1. Protection and treatment of animals in chemical warfare.
2. Measures for the prevention of animal plagues under war-time conditions.

Section X. Veterinary physiology:

1. Physiological fundamentals of animal nutrition.
2. Physiology of the mammary gland.
3. Recent investigations on the physiology of the rumen and reticulum of ruminants.
4. Recent investigations on the physiology of heredity.

It is the intention to limit the number of the papers to be presented to 60, in order to leave sufficient time for the social events and sight-seeing tours. As I was requested to have eight or ten reporters selected from the United States, it will be necessary to have our National Committee begin work along these lines in the very near future. A promise was also requested that at least 100 members from the United States be in attendance at the Swiss Congress and I assured the Committee that I would do everything I could, both personally and officially, to comply with these wishes.

Prof. Leclainche, president of the Permanent Committee, wishes me to present a festival address on "Control of Infectious Diseases," while the Organizing Committee has asked for a paper on "The Rôle of the Tuberculin Test in the Control of Tuberculosis." I promised to accept one of these assignments but informed them it would be inappropriate to appear on the program more than once.

In this connection it may be of interest to learn that the officials of the Organizing Committee, in addition to Dr. G. Flückiger as President, are Dr. E. Graeub, of Bern, General Secretary, and Dr. H. Baer, of Zurich, Treasurer. Many of those who attended the New York Congress will remember the culture and cordiality of the latter, who also made the post-Congress tour to Chicago with the foreign delegates in the place of Dr. Flückiger, who was recalled from New York by his government for military duty before the Twelfth International Veterinary Congress closed.

It was also a pleasure to renew friendship with Prof. Dr. W. Steck, of the University of Bern, who so ably assisted at our New York Congress as interpreter for the French and German speakers. I called on Prof. Leclainche, president of the Permanent Committee, in Paris; Mr. P. J. L. Kelland, assistant secretary of the Permanent Committee, in London; and met Professors Marek and Manninger, of Budapest, the latter having taken the lamented Hutyra's place on the Permanent Committee. Dr. Adolph Eichhorn, also a member of the Permanent Committee from the United States, joined me at Budapest, and with his outstanding linguistic ability assisted greatly in making my visit both pleasant and profitable.

During the past two months, it was my great privilege to have contacted the following foreign officials of the International Veterinary Congress: Prof. Dr. Hermsdorff, president of the Brazil National Committee; Dr. Boussard, of the French National Committee; Prof. Dr. Meissner, Prof. Dr. Waldmann, and Drs. Weber and Bellar, of the German National Committee; Prof. J. Basil Buxton, president of the British National Committee; Prof. Dr. H. C. L. E. Berger, of the Netherlands National Committee; and Prof. Dr. G. K. Constantinesco, of the Rumanian National Committee.

Further information regarding the Thirteenth International Veterinary Congress will be furnished from time to time as the plans become more crystallized.

Very truly yours,

J. R. MOHLER.

Washington, D. C., Sept. 8, 1936.



COLORADO VETERINARY MEDICAL ASSOCIATION

The semi-annual meeting of the Colorado Veterinary Medical Association was held at the Veterinary Hospital, Fort Collins, May 27-29, 1936. This was the first attempt on the part of the Association to conduct a three-day meeting. The result was very satisfactory, with the exception of having a little too much program carried over until the last day, which caused some crowding.

Chairmen for the three sections were: Large animals, Dr. E. E. Tobin; small animals, Dr. A. N. Carroll; entertainment, Dr. J. H. Bouton.

The address of welcome was delivered by Dr. C. A. Lory, president of Colorado State College. The literary program consisted of papers on timely subjects, such as:

"Anthelmintics—Ovine," Dr. I. E. Newsom.

"Gastro-intestinal Disturbances—Bovine," Dr. E. E. Tobin.

"Hospitalization of Small Animals" and "Stuttgart Disease—Canine," Dr. E. A. Eastman, Moline, Ill.

"The Use of Blood as a Therapeutic Agent" and "Canine Distemper," Dr. Ashe Lockhart, Kansas City, Mo.

"Gastro-intestinal Disturbances—Canine," Dr. A. P. Drew.

"Oat-Hay Poisoning—Bovine," Drs. A. H. Francis, E. N. Stout, George W. Stiles and I. E. Newsom and Prof. J. W. Tobiska.

"Encephalomyelitis—Equine," Dr. H. C. Smith, Fort Dodge, Iowa.

"A Few of the Important Factors in Encephalomyelitis," Dr. H. J. Shore, Fort Dodge, Iowa.

Dr. J. C. Flynn, of Kansas City, Mo., president of the American Veterinary Medical Association, gave an address on "The Importance of the A. V. M. A. to the Veterinary Profession."

The clinical program consisted of the following operations and demonstrations:

Firing ringbone and sidebone, Dr. G. H. Oliver.

Use of the x-ray in large animals, salivary fistula—equine, thoracotomy for removal of foreign body—bovine, median neurectomy—equine, and sesamoiditis—equine, Dr. James Farquharson.

Uses of aluminum rod for casting fractures in small animals, dental surgery—canine, and spaying—canine, by Dr. D. A. Eastman.

Thoroughpins, Drs. James Farquharson and L. L. Glynn.

Stripping—canine, Dr. J. R. Naylor.

Ear-trimming, Dr. A. A. Hermann.
Equine dentistry, Dr. M. J. Woodliffe.
Actinomycosis—bovine, Dr. R. E. Tinsman.
Allergy—equine, Dr. Frank Breed, Lincoln, Neb.
Abdominal abscess—bovine, Dr. H. P. Scott.
Demonstration of electric cautery, Dr. J. H. Bouton.
Intravenous medication—canine, Dr. C. C. Stewart.
Ablation of cancer of eye—bovine, Dr. Truman I. Means, Santa Fe, N. Mex.
Removal of granuloma of penis—bovine and cryptorchidectomy—equine, Dr. Ellis Kingman, Cheyenne, Wyo.
Teat fistula—bovine, Dr. A. N. Carroll.
Castration—equine, Dr. Arthur Keithly.
Amputation of cancer of penis—equine, Dr. John Utterback.
Sutureless spaying and plastic surgery—canine, Dr. J. C. Flynn.

Several cases of equine lameness were presented and discussed by practitioners. A very good attendance was maintained throughout the entire meeting. The dinner at the Northern Hotel and the banquet and dance at the Country Club were enjoyed by a large crowd. Entertainment for the ladies was offered in the form of a tea at the home of Mrs. I. E. Newsom and an auto trip to Trail's end, where luncheon was served.

To put on a three-day meeting requires considerable effort and time, as many who have had the experience know. Credit for the success of the meeting goes to President C. J. Hayden and the chairmen of the three sections, Drs. Tobin, Carroll and Bouton.

B. R. MCCRORY, *Secretary-Treasurer.*

PACIFIC NORTHWEST VETERINARY MEDICAL ASSOCIATION

The Pacific Northwest Veterinary Medical Association, which includes the British Columbia, Oregon and Washington Veterinary Medical associations, assembled in annual meeting, July 6-8, 1936, at the Winthrop Hotel, Tacoma, Wash. In its 19th year, this affair could be well regarded as more than a meeting; it is a reunion, having an international flavor, where jolly good fellows get together. Although not on the official program, the proposal of adopting Canada, or vice versa, has been pretty well agreed upon.

One hundred members attended, many accompanied by their wives, who enjoyed a special program arranged for their entertainment, including teas, tours and theatres. Proper time was allotted for golf, and such sessions as occur in room 709. Just imagine! There was a delightful dinner dance, where the perennial orator with after-dinner inclinations was strictly limited

by Dean Wegner as toastmaster, although the story about the Irishman was related.

The business meeting gave the question of the classification of veterinary colleges by the A. V. M. A. quite a dusting off, touching all of the details thoroughly, and the mother institution, by suitable resolutions, was admonished to tidy up the attic and get going.

Adjournment was made to Portland, Oregon, in 1937. The following subjects were presented as the technical program:

"Canine Distemper, Its Complications and Sequelae," Dr. D. G. Pinder, Vancouver, B. C.

"Personal Experiences with Intravenous Medication," Dr. J. L. Ellis, Tacoma, Wash.

"Better General Anesthesia in Animals," Dr. N. G. Covington, Pullman, Wash.

"The Laboratory Diagnosis of Mastitis," Mr. L. O. Tucker, Tacoma, Wash.

"Anaplasmosis, with Case Reports," Dr. E. R. Derflinger, Eugene, Ore.

"Grayhound Racing Problems," Dr. J. B. Harrison, Portland, Ore.

"Small-Animal Nutrition," Dr. T. E. Sleeth, Vancouver, B. C.

"Bacterial Fibrinolysins of Veterinary Interest," Dr. W. H. Manwaring and Mr. R. R. Madison, Leland Stanford University.

"The Control and Elimination of Bang's Disease," Dr. Robert Prior, Olympia, Wash.

"Interrelationship of Nutrition, Health and Milk Production in Managing a Dairy Herd," Mr. Albert P. Wertman, Steilacoom, Wash.

"Vitamins and Concentrates," Dr. W. H. Lytle, Salem, Ore.

"Poisonous Plants," Mr. M. S. Grunder, Puyallup, Wash.

"Recent Contributions to the Knowledge of Bovine Mastitis," Dr. O. H. Muth, Corvallis, Ore.

Dr. D. G. Pinder, of Vancouver, B. C., won the \$5.00 prize for having the best paper on the program, and Washington won a similar prize for attendance.

V. C. PAUHLMAN, *Secretary*, W. V. M. A.

VETERINARY ASSOCIATION OF SASKATCHEWAN

At the twenty-eighth meeting of the Veterinary Association of Saskatchewan, held at the University of Saskatchewan, Saskatoon, July 22, 1936, practically the whole time was taken up by the discussion of contagious abortion control in the province. As new cases of undulant fever are constantly being recognized in humans, it was felt that the question was of prime importance, not only from the standpoint of the stockman, but also from the standpoint of public health as well. The only feasible plan to wipe out undulant fever in man is to eliminate contagious abortion in live stock.

As a result of the discussion and the means at the disposal of the veterinary surgeons in the province, three different methods were evolved to handle the disease for the present:

First, by private efforts of the stock-owner and the local veterinary surgeon. More testing of cattle is being done by this system than any other at present. Cattle-owners have become acutely conscious of the disease through the information spread by the veterinary surgeons, led by the Animal Disease Laboratory of the University of Saskatchewan.

The second scheme is to test the cattle on a community basis, about 200 head being considered the minimum number, the provincial government undertaking to pay the laboratory fee for the owners if they sign a contract calling for ear-tagging, proper disposal of reactors, sanitation and isolation.

The third scheme deals with the milk supply to cities, towns and villages. The urban authority prohibits any dairyman from selling milk in the community unless his cattle are all negative to the test. The provincial government undertakes to pay the laboratory fee for the blood test if the cattle-owner signs the above contract and lives up to the requirements. In all three schemes the owner has to pay the veterinary surgeon for taking the blood sample, and in the private testing scheme he also pays the laboratory fee.

The Provincial Live Stock Commissioner, who was present, was hopeful that the Minister of Agriculture would undertake to pay the laboratory fees for all tests when financial conditions would permit. This would necessitate the cattle-owner signing the contract as to disposal of reactors, sanitation and isolation.

The election of officers resulted as follows: President, Dr. D. W. McDonald, Moose Jaw; vice-president, Dr. H. Richards, Indian Head; registrar, Dr. Norman Wright, Saskatoon; council in addition to the above, Drs. M. Barker, Regina; A. Chambers, Regina; J. S. Fulton, Saskatoon, and J. L. Millar, Asquith.

NORMAN WRIGHT, *Registrar*.

MONTANA VETERINARY MEDICAL ASSOCIATION

The twenty-eighth annual meeting of the Montana Veterinary Medical Association was held in Kalispell, July 23-24, 1936. The attendance was good, although several veterinarians were unable to attend on account of the large number of cattle being moved out of the dry areas in the state. All the field men employed by the U. S. Bureau of Animal Industry were present to

meet Dr. G. W. Cronen, who is replacing Dr. J. W. Murdoch as inspector-in-charge for Montana. Dr. Murdoch has been transferred to Lincoln, Nebraska, where he will be in charge of field inspection for the state of Nebraska.

All of the first afternoon of the meeting was devoted to the discussion of equine encephalomyelitis. Dr. Edward Records, of the Nevada Experiment Station, was the principal speaker on this subject, and from his extensive experience in the investigation and control of this disease, he was able to give the Montana veterinarians an understanding of the nature of the disease and definite ideas as to methods of procedure in handling an outbreak. The subject of immunity to encephalomyelitis was also ably discussed by Dr. H. R. Cox, of the U. S. Public Health Service Laboratory at Hamilton.

Glen A. Smith, of the U. S. Forest Service, spoke on "Problems of Nutrition and Parasitism in Wild Animals of the National Forests." Dr. C. B. Philip, entomologist of the U. S. Public Health Service Laboratory at Hamilton, discussed "The Problem of the Control of the Wood-Tick," with particular reference to tularemia and tick-paralysis in animals.

Dr. J. S. McFarland, of Whitefish, and Dr. I. A. Phinney, of Kalispell, who are engaged in the production of foxes, presented very interesting discussions on "Some Phases of Fox Farming," with emphasis on nutrition and parasitism.

Dr. L. E. Patton, of the U. S. Bureau of Animal Industry, was elected president for the year 1936-1937, to succeed Dr. E. A. Tunnicliff, of Bozeman. Dr. A. H. Cheney, of Polson, was elected vice-president, and Dr. H. Marsh, of Bozeman, secretary-treasurer.

H. MARSH, *Secretary*.

PUBLICATIONS RECEIVED

The Etiology of Fowl Paralysis, Leukemia and Allied Conditions in Animals. III. The intestinal flora of chickens affected with enteritis associated with intestinal parasitism. IV. The pathologic manifestations of the causal microorganisms in the fowl. M. W. Emmel. (Bul. 293. Univ. of Fla. Agr. Exp. Sta., Mar., 1936. pp. 23.)

Synchronicity, Periodicity, and the Length of the Asexual Cycle of *Plasmodium rouxi* in the Canary. Fruma Wolfson. Reprint from *Amer. Jour. Hyg.*, xxiii (1936), 2, pp. 340-348. Illus.

Experimental Infections of Rats with *Endamoeba histolytica*. Floyd O. Atchley. Reprint from *Amer. Jour. Hyg.*, xxiii (1936), 2, pp. 410-414.

Timber Milk Vetch as a Poisonous Plant. I. E. Newsom, Floyd Cross, B. R. McCrory, A. H. Groth, J. W. Tobiska, Earl Balis, L. W. Durrell, E. C. Smith and E. N. Stout. (Bul. 425. Colo. Agr. Exp. Sta., April, 1936. pp. 42. Illus.)

NECROLOGY



SIR ARNOLD THEILER

The August number of this JOURNAL briefly mentioned the death of Sir Arnold Theiler, in London, on July 25, 1936. The life of this man was so extraordinary, his accomplishments so far-reaching and his acquaintance with American veterinarians so wide that this obituary has been prepared in tender recollection of his visits, accompanied by his life-long helpmate, Lady Theiler, to this country in 1923 and 1934, and also for the information of the profession.

This man, the son of an educator, was born in the village of Frick, Canton Aargau, Switzerland, on March 26, 1867. Educated in the public schools of his birthplace, he chose the veterinary profession for a career and studied at Bern.

In 1891, he proceeded to South Africa. Despite the fact that this was the country in which his career was to be founded and his scientific triumphs achieved, he had considerable difficulty in getting started, because of lack of appreciation of veterinary services in that part of the world in those early days. During this period, he met the extreme misfortune of losing his left arm at the elbow while handling machinery in farm operations. When Robert Koch, the great German scientist and discoverer of the tubercle bacillus, went to South Africa to study East Coast fever, Theiler became his assistant and this was the start of his scientific career in that country. It is interesting to note in this connection that the etiological agent of East Coast fever was described by Theiler in 1904, under the name of *Piroplasma parvum*. Three years later, a new genus for the piroplasma was created under the name of *Theileria* and, in 1918, a new family, Theileridae, was established. The latter includes those organisms which multiply in the cells of the lymphatic system by the process of schizogony, thus differentiating them from the Piroplasmidae, which multiply in the blood of the vertebrate host by fission.

He was married in 1893 to Emma Jegge, from his native canton in Switzerland, and they had two sons and two daughters.

Both sons completed their education in America and are well-known scientists here.

In his early work, a smallpox epidemic occurred among the population and he prepared the vaccine lymph for human vaccination. His knowledge of the technical procedure involved gave him command of the situation and attracted the attention of President Paul Krüger. He was appointed government veterinarian in 1896. From here, in his primitive laboratory, he proceeded to study infectious animal diseases, the results of which stabilized the live stock industry in South Africa and brought him world renown. He successively became Director of Veterinary Research and Director of Veterinary Education and Research, Union of South Africa; Professor of Tropical Veterinary Medicine, Transvaal University, and Dean of the Faculty of Veterinary Science, University of South Africa. He developed around him a very able corps of scientists and directed the construction of most elaborate research laboratories at Onderstepoort, Pretoria. In recognition of his services to the British Empire, he was knighted K. C. M. G. in 1914 by the Crown.

At about the time when he went to South Africa, Smith and Kilbourne, in this country, were doing their classical work on Texas fever and they observed the anaplasma bodies in the red blood-cells of cattle afflicted with the disease. They, however, regarded them as stages in the life cycle of *Piroplasma bigeminum*. Theiler, in 1910, was the first to recognize anaplasmosis as a distinct disease and it has since been recorded in many parts of the world. He further differentiated *Anaplasma centrale* from *A. marginale*, showed that the former produced a mild, non-fatal form of the disease, and successfully used it to vaccinate animals against the rather highly fatal malady caused by the *A. marginale*.

One of the most difficult problems with which he was confronted was African horse-sickness. This disease became very fascinating to him and his untiring efforts with it cleared up many phases of the disease and led to the first fairly successful vaccination. His son, Dr. Max Theiler, working in this country with the Rockefeller Foundation, showed that yellow fever could be transmitted to white mice by intracerebral injection of the virus and also that the virus could be modified by repeated passage through mice. These findings were immediately applied to African horse-sickness virus by Alexander, under the direction of Dr. P. J. du Toit with success, and vaccine is now prepared from mouse virus that produces a solid immunity in horses against homologous strains of field virus.

In the prolonged investigation of the serious cattle disease known as "lambsiekte," on the South African veldt, the tireless efforts of this man and his assistants resulted in complete elucidation. Lambsiekte is now known to be a form of botulism caused by the type C organism and the toxin is obtained by the cattle in consuming dead animals and green bones on the veldt. The depraved appetite results from the vegetation being too low in phosphorus. This carried the research into the field of nutrition and by supplying bone meal to the diet of the animals, the craving stopped and the disease was prevented, thus making thousands of square miles of territory profitable for live stock production. This particular work led to similar observations in other parts of the world and it is now known that phosphorus deficiency is a matter to be reckoned with in live stock production in practically all of the semi-arid parts of the world, including large areas in the United States.

His logical mind, coupled with an indomitable will and strong personality, brooked no interference and knew not the term "failure." He was a very interesting conversationist and it was a rare treat to have him discuss his many and varied experiences, both scientific and recreational, in the country of his adoption. He spent some time in the camp of the late President Theodore Roosevelt, while the latter was on his big game-hunting expedition in Africa.

In 1927, he retired from his position in South Africa and returned to his native Switzerland. Making his home in Lucerne, he continued the study of the pathological changes in bones caused by phosphorus deficiency, the specimens being forwarded from Onderstepoort. Most elaborate treatises of the findings were prepared and published, which are classical in their detail and completeness. During these years, various countries called him to survey their animal-disease problems and research organizations studying them. Australia offered him a permanent post, but his health would not permit him to accept the great responsibility involved. However, his publication on observations made in travelling through that country is a very enlightening exposé of their problems.

In 1934, following the close of the Twelfth International Veterinary Congress in New York, where he was awarded the Budapest Prize for outstanding research work in veterinary problems, he proceeded across the United States, stopping at various points and finally sailed from Seattle for Onderstepoort, again to become associated in an advisory capacity with the great organiza-

tion developed by himself and his brilliant successor and friend, P. J. du Toit.

In 1936, he returned to London, where he had been associated with the Imperial Bureau of Animal Health since 1933. Honorary degrees had been granted him by various institutions, including Doctor of Science, by Syracuse University during the World's Dairy Congress, in 1923; Doctor of Philosophy, by Bern; Honorary Doctor of Veterinary Science, by the University of South Africa, and Honorary Associate of the Royal College of Veterinary Surgeons England.

He held honorary memberships in several scientific bodies in South Africa, Switzerland, England, Ireland, Italy, Belgium, France, Austria, Australia, New Zealand, Canada and this country.

It can thus be truly said that he was a man of world renown, one to whom the world owes a debt of gratitude and whose life was an inspiration for his contemporaries and those that follow. His was a standard of achievement of which the veterinary profession may well be proud.

G. H. H.

FREDERICK SUMNER GRAY

Dr. Frederick Sumner Gray, of Plymouth, N. H., died at Concord, N. H., February 13, 1935. He was born at Natick, Mass., April 17, 1874, and was a graduate of the Chicago Veterinary College, class of 1909. He practiced at Miles City, Mont., for about eleven years, before locating at Plymouth, N. H. He was a deputy state veterinarian of Montana from 1913 until 1921.

Dr. Gray joined the A. V. M. A. in 1910. He is survived by his widow (née Maude A. Goodwin) and a daughter.

NATHAN FRUTKOW

Dr. Nathan Frutkow, of Chicago, Ill., died at the Henrotin Hospital, that city, July 20, 1936, at the age of 46. A streptococcic infection of the ear was the cause of death.

Born in Poltava, Russia, Dr. Frutkow was educated at the University of Moscow. He came to the United States in 1910 and shortly thereafter entered the Kansas City Veterinary College. He was graduated in 1914. Subsequently he studied medicine at the University of Kansas. During the late war he served as bacteriologist in an airplane fabric plant at Terre Haute, Ind. After the war he studied at the Pasteur Institute

in Paris and in Vienna, and later in the research laboratories of the University of Chicago. Two years ago he resumed private practice.

C. R. LAWLER

Dr. C. R. Lawler, of Milan, Mo., died in January, 1936, of pneumonia. He entered the Kansas City Veterinary College in 1910, but was not graduated until 1918. He had been in practice at Milan ever since his graduation.

A. T. K.

F. W. ROACH

Dr. F. W. Roach, of La Harpe, Kan., died February 7, 1936, after a prolonged illness due to asthma and complications. He was a graduate of the Kansas City Veterinary College, class of 1905, and practiced first at Anthony, Kan., before going to Hiawasee, Ark., about 1921, in the interests of his health. He engaged in fruit farming in Arkansas for several years and then returned to Kansas, locating at La Harpe.

W. F. LAZEAR

Dr. W. F. Lazear, formerly of Humeston, Iowa, died at the home of his son, Dr. W. R. Lazear (Chi. '14), Derby, Iowa, July 13, 1936. He was a graduate of the Chicago Veterinary College, class of 1894, and practiced at Humeston for many years.

FREDERICK GEORGE CASLICK

Dr. Frederick G. Caslick, of Morristown, N. J., died of pneumonia in the Morristown Memorial Hospital, July 30, 1936. Born at Woodward, Okla., February 5, 1905, he attended local schools and studied veterinary medicine at Cornell University. Following his graduation in 1930, he practiced at Versailles, Ky., then went to Newport, R. I., and later to Morristown, N. J.

Dr. Caslick joined the A. V. M. A. in 1931. He was a member of Omega Tau Sigma Fraternity and held a commission as second lieutenant in the Veterinary Reserve Corps. He is survived by his widow, his parents, three brothers and three sisters.

CHARLES H. TAYLOR

Dr. Charles H. Taylor, of Cortland, N. Y., died suddenly of heart disease at his home, August 12, 1936. He was a graduate of the New York State Veterinary College at Cornell University,

class of 1905. For a number of years he had been a field veterinarian for the Borden Farm Products Company and had been stationed at Niagara Falls, N. Y., De Kalb, Ill., and Cortland, N. Y.

Dr. Taylor joined the A. V. M. A. in 1911. He was a member of the Twelfth International Veterinary Congress.

EARL RAYMOND WORLEY

Dr. Earl R. Worley, of Pasadena, Calif., died suddenly at his home, August 12, 1936.

Born at Fairbury, Neb., August 21, 1886, Dr. Worley attended local schools, Crete (Neb.) High School and Nebraska Wesleyan University, at Lincoln, before entering the Chicago Veterinary College. Following his graduation in 1914, he located at Ashland, Neb. Later he practiced at Neligh, Neb. About ten years ago he removed to California and located in Huntington Park. In 1929 he removed to Pasadena, where he built a modern veterinary hospital.

Dr. Worley served in the Veterinary Corps of the Army during the World War. He was commissioned as 2nd lieutenant, September 22, 1917, and assigned to duty in Kansas City, October 4, 1917, as inspector of public animals. He was directed to report at Camp McClellan, May 3, 1918, for duty with the 309th Auxiliary Remount Depot. He was promoted to 1st lieutenant, September 13, 1918, and was stationed at Camp Jackson, S. C., Washington, D. C., Camp Funston, Kan., and Fort Sill, Okla., before his discharge, May 27, 1919.

Dr. Worley joined the A. V. M. A. in 1917. He was a member of the Twelfth International Veterinary Congress and the Southern California Veterinary Medical Association. He is survived by his widow (née Gertrude Farley), one daughter, one sister, two brothers and his parents.

W. L. C.

THEODORE ROOSEVELT MORSE

Dr. Theodore R. Morse, of Saint Louis, Mo., aged 36 years, drowned while swimming in the Meramac River, near Saint Louis, August 20, 1936. He was a graduate of the Saint Joseph Veterinary College, class of 1923, and was a member of the meat inspection force of the U. S. Bureau of Animal Industry at Saint Louis. He entered the service in 1927. Surviving Dr. Morse are his widow and a step-brother.

JOSEPH A. TOGNOTTI

Dr. Joseph A. Tognotti, of Leland, Miss., died August 31, 1936, after a protracted illness.

Born in San Francisco, Calif., December 4, 1880, Dr. Tognotti received his early education in the public schools and then entered the San Francisco Veterinary College. He was graduated in 1906 and practiced at Waynesboro, Hazelhurst and Crystal Springs, Miss., before locating at Leland. During the World War, he was commissioned as a second lieutenant in the Veterinary Corps, Dec. 19, 1917; was ordered to Camp Greenleaf, Ga., June 6, 1918; assigned to the 17th Division at Camp Beauregard, La., August 24, 1918, and promoted to first lieutenant, Sept. 23, 1918. He also served at Camp Shelby, Miss., before his discharge, April 30, 1919.

Dr. Tognotti joined the A. V. M. A. in 1918.

FRED A. MURRAY

Dr. Fred A. Murray, of Austin, Texas, died September 3, 1936, after a prolonged illness.

Born in Rotterdam, Holland, June 24, 1884, Dr. Murray was a graduate of the Texas A. and M. College, class of 1920. He was engaged in practice in Austin.

Dr. Murray joined the A. V. M. A. in 1929. He was a member of the State Veterinary Medical Association of Texas and, at the time of his death, was president of the Texas State Board of Veterinary Medical Examiners. He is survived by his widow (née Mary Clark).

HERBERT T. B. COOKE

Dr. Herbert T. B. Cooke, of Philadelphia, Pa., was found shot to death in his home, September 12, 1936. He had suffered a nervous breakdown recently.

Born in Philadelphia, August 22, 1890, Dr. Cooke received his early education in the public schools, and then took a business course at the Brown Preparatory School before entering the University of Pennsylvania. Following his graduation in 1911, he entered general practice in Philadelphia.

Dr. Cooke joined the A.V.M.A. in 1929. He is survived by his widow, three sons and a brother, Dr. William A. Cooke (U. P. '09), also a veterinarian.

MAJOR EVERETT C. CONANT

Major Everett C. Conant, V. S., U. S. A., died at Fort Reno, Okla., September 18, 1936.

Born in Passaic, N. J., December 8, 1895, Major Conant received his preliminary education in the public schools of Passaic. He studied veterinary medicine at the University of Pennsylvania. Following his graduation in 1917, he entered military service as a second lieutenant (July 16, 1917). He remained in the service until his death, having attained the grade of major on August 3, 1931.

After returning from service with the A. E. F., Major Conant served at various stations throughout the United States, including the Army Transport "Meigs." He was an Honor graduate from the Army Veterinary School in 1921. Just prior to going to Reno, Major Conant completed a course of instruction at the University of Kentucky in the science of breeding and in clinics.

Major Conant joined the A. V. M. A. in 1919. He is survived by his widow.

FRANKLIN F. JACOBS

Dr. Franklin F. Jacobs, of Indianapolis, Ind., died in the City Hospital, September 26, 1936, after a long illness.

Born in Dayton, Ohio, July 10, 1865, Dr. Jacobs moved to Indianapolis in 1891. He was a graduate of the Indiana Veterinary College, class of 1902, and had been in practice in Indianapolis since his graduation. He is survived by his widow, four daughters, three sons, three brothers and a sister.

GEORGE A. KNAPP

Dr. George A. Knapp, of Millbrook, N. Y., died at his home, September 27, 1936. Death was due to a stroke of apoplexy. He was 69 years of age, and a graduate of the New York College of Veterinary Surgeons, class of 1895. He had been in practice at Millbrook ever since his graduation and was active in both civic and professional circles.

Dr. Knapp joined the A. V. M. A. in 1902. He was a member of the New York State Veterinary Medical Society, the Hudson Valley Veterinary Medical Association, the Veterinary Medical Association of New York City and the Twelfth International

Veterinary Congress. He is survived by his widow (née Mary E. Van Wagner), one son and one sister.

FRANK G. ATWOOD

Dr. Frank G. Atwood, of New Haven, Conn., died at his home, September 14, 1936, after an illness of several weeks, due to heart trouble. He was a graduate of the Ontario Veterinary College, class of 1898, and had been located in New Haven ever since his graduation.

Dr. Atwood was a veterinarian with ideas that did not always conform with the traditional conventions of his profession. For example, a few years ago, he announced himself and staff to the public as "health engineers," with offices in New Haven, Hartford and New York. His letterheads read, "Consultations. Investigations. Analysis. Development and Supervision." Consultations were by appointment and, as a part of the service offered, he maintained a "laboratory and department of immunology." A few years later, Dr. Atwood's letterheads indicated that he was in the insurance business. Two years later, his letterheads read "Dr. Atwood and Staff Veterinary Service. Small Animal Specialists."

Every profession has someone of the type of Dr. Atwood. His "advanced" ideas never did the veterinary profession any good and frequently were the cause of annoyance and embarrassment to ethical practitioners.

His widow and two daughters survive.

S. N. KINGREY

Dr. S. N. Kingrey, of Worthington, Minn., died September 27, 1936, in the Worthington Hospital, as a result of injuries. Dr. Kingrey and two companions were mounted on their horses when an intoxicated hit-and-run driver struck the horse Dr. Kingrey was riding, causing him to be thrown to the ground. He received a compound fracture of the tibia and fibula and possibly internal injuries. The driver of the automobile was apprehended and has been bound over to the district court on a charge of second-degree murder.

Born at Monroe, Iowa, March 6, 1887, Dr. Kingrey attended local grade and high schools before entering the Chicago Veterinary College. He was graduated in 1916 and, the following year, entered into partnership with the late Dr. J. N. Gould, at Worth-

ington. Since Dr. Gould's death, in 1932, Dr. A. L. Birch was associated with Dr. Kingrey in conducting a large veterinary practice.

Dr. Kingrey joined the A. V. M. A. in 1919. He was a member of the Minnesota State Veterinary Medical Society. He was a member of the Methodist Episcopal Church of Worthington and also of the Odd Fellows Lodge. Dr. Kingrey always showed a great interest in the young boys of Worthington and was always ready to help them with their problems, with a view to making them better citizens. He always maintained two or three horses in his stables for the use of these boys. He is survived by his widow (née Edna Curry), his mother, five brothers and four sisters.

H. C. H. K.

CLOUD C. WINEGARDNER

Dr. Cloud C. Winegardner, of Goshen, Ind., dropped dead in his office on September 29, 1936. He had been in apparently good health and had just returned from luncheon at his home when he suffered a heart attack, dying almost immediately.

Born in Bryan, Ohio, February 22, 1882, Dr. Winegardner was a graduate of the Western Veterinary College (Kansas City, Mo.), class of 1904, and had practiced in Goshen for about 30 years. He practiced in Leipsic, Ohio, for a brief period following his graduation.

Dr. Winegardner joined the A. V. M. A. in 1922. He is survived by his widow (née Sabina Hoffman), one daughter, his parents and one brother.

JOHN BENSON BELL

Dr. John B. Bell, of Pasadena, Calif., died at his home, October 1, 1936. Death was due to heart trouble.

Born at Ceres, N. Y., March 24, 1886, Dr. Bell received his preliminary education at the Portville (N. Y.) High School and Alfred University. He studied veterinary medicine at the New York State Veterinary College, Cornell University, and was graduated in 1909. He immediately accepted a position in the Philippines, where he was engaged in the control and eradication of rinderpest and surra.

After four years in the Philippines, Dr. Bell returned to the United States and accepted a position with the University of

California. He was assigned to the control of hog cholera in the Imperial Valley. In the spring of 1918, he accepted the position of City Veterinarian of Pasadena and remained in this work until 1922. He then entered general practice and erected a modern hospital for small animals at 2116 E. Colorado.

Dr. Bell joined the A. V. M. A. in 1913. He was a member of the California State Veterinary Medical Association, the Twelfth International Veterinary Congress and the Masonic fraternity. He is survived by his widow (née Lulu Easton), four daughters, four sisters and one brother.

W. L. C.

HARRY D. CHAMBERLAIN

Dr. Harry D. Chamberlain, of Belvidere, Ill., was found dead in bed at his home the evening of October 8, 1936. He had been about during the day and appeared to be in his usual health.

Born at Waterloo, Ind., October 28, 1866, Dr. Chamberlain finished high school before entering the Ontario Veterinary College. He was graduated in 1887 and located at Belvidere, Ill., where he was engaged in general practice until a few years ago, when he entered the employ of the State Department of Agriculture. He was assigned to tuberculosis eradication, a project in which he had a deep interest. He had pioneered this work in his own county (Boone). He retired about three years ago.

Dr. Chamberlain joined the A. V. M. A. in 1928. He was a member of the Illinois State Veterinary Medical Association, the U. S. Live Stock Sanitary Association and the Northern Illinois and Southern Wisconsin Veterinary Society.

JOHN R. MUDD

Dr. John R. Mudd, of Stronghurst, Ill., died at his home, October 20, 1936, after an illness of a month. Pneumonia was the cause of death.

Born in Raritan Township, Henderson County, Ill., May 21, 1884, Dr. Mudd attended the McKillip Veterinary College. Following his graduation in 1918, he entered general practice at Stronghurst, where he remained until his death. He is survived by his widow (née Ruth Botts), his parents, four sisters and seven brothers. One of the latter is Dr. R. O. Mudd (McK. '19), of Biggsville, Ill.

DANIEL E. SELLER

Dr. Daniel E. Seller, of Manistique, Mich., died at the Schoolcraft County Infirmary, October 20, 1936, after a lengthy illness. He had been superintendent of the infirmary for several years.

Born in Wellington County, Ontario, March 14, 1865, he attended local schools there and in Illinois before entering the Ontario Veterinary College. Following his graduation in 1893, he located at North Branch, Mich., where he practiced for four years. In 1897, he completed a course in pharmacy and resumed practice in Manistique. About six years later his health failed and he gave up practice to go into the implement and carriage business. In 1914 he sold his holdings and went into the real estate business. In 1927 he was appointed to the Board of Poor Commissioners, a post he resigned shortly afterward to accept the position he held at the time of his death.

Dr. Seller always was prominent in civic, church and fraternal activities. He was affiliated with the Masons and the Maccabees. He is survived by his widow (née Minnie G. Chute), one daughter, two sons, one sister and two brothers.

ALBERT W. JAMES

Dr. Albert W. James, of Cameron, Mo., died at his home, September 8, 1936, at the age of 65 years. He was a graduate of the Ontario Veterinary College, class of 1895, and had been in practice at Cameron ever since his graduation. He is survived by his widow and one son.

PERSONALS

MARRIAGES

DR. T. A. CASE (K. S. A. C. '12), of Nickerson, Kan., to Miss Lillian Hallum, of Strathmore, Calif., at Sedalia, Mo., May 7, 1936.

DR. E. F. FINKE (K. S. C. '33), of Buchner, Mo., to Miss Thelma Mae Hartley, at Levasy, Mo., August 23, 1936.

DR. EDWARD E. THOMPSON (Iowa '34), of Roanoke, Va., to Miss Virginia Morris, of Longdale, Ala., at Roanoke, October 1, 1936.

DR. LEE K. BAILEY (Iowa '33) to Miss Katie Whitmore, both of Lexington, Va., October 7, 1936.

DR. F. L. HARRISON (Ont. '07), of Bad Axe, Mich., to Miss V. Blanche Smith, of Ubly, Mich., at Flint, Mich., October 8, 1936.

DR. W. H. IVENS, JR. (U. P. '34) to Miss June Louise Shearer, both of Philadelphia, Pa., October 17, 1936.

PERSONALS

DR. WILLIAM CASLICK (Corn. '27) reports a change of address from Otego, N. Y., to Paris, Ky.

DR. CLARK METZ (Corn. '36) is assisting Dr. C. Harvey Smith (Chi. '09), of Crown Point, Ind.

DR. JAMES C. HICKEY (A. P. I. '35) has changed locations from Pine Forge, Pa., to Pottstown, Pa.

DR. L. G. KUTSHER (U. P. '34) is now associated with Dr. Fred J. Badger (O. S. U. '25), of North Hackensack, N. J.

DR. GERALD W. HOLMBERG (O. S. U. '36) has left Sanbornville, N. H., and is now assisting Dr. H. M. Lewis (Chi. '08), at Nashua, N. H.

DR. C. L. BRIGGS (U. P. '26) has resigned his position with the U. S. Bureau of Animal Industry and has entered practice at Meadville, Pa.

DR. RALPH M. DIX (O. S. U. '11), of Cambridge, Ohio, is a candidate to succeed himself as coroner of Guernsey County, on the Democratic ticket.

DR. C. W. LASSEN (McK. '06), formerly of Pendleton, Ore., has been working as a meat inspector for the Bureau of Health, Portland, Ore., the past year.

DR. NORMAN M. TWISSELMANN (Iowa '36), of Maricopa, Calif., has joined the staff of the Division of Veterinary Science, University of California, Berkeley.

DR. J. G. CATLETT (U. S. C. V. S. '16), of Miami, Fla., was Supervisor of Saliva Tests for the New York State Racing Commission at Belmont Park the past season.

DR. R. A. HENDERSHOTT (O. S. U. '17) has been Acting Chief of the New Jersey Bureau of Animal Industry, since the death of Dr. J. H. McNeil on September 18.

DR. W. F. LUDWIG (O. S. U. '14), of Barnesville, Ohio, was shot in the right leg and arm while hunting squirrels near Marietta, early in October. About 20 shots struck him.

DR. M. J. DAIR (Amer. '95), of Manhasset, Long Island, N. Y., was veterinary advisor to the stewards of the Westchester Racing Association at Belmont Park the past season.

DR. H. L. CAMPBELL (K. C. V. C. '18), of Tuscola, Ill., addressed the local Rotary Club on October 20. His topic was "Progress in the Field of Veterinary Medicine and Surgery."

DR. EVERETT G. PRINGLE (Mich. '32), who has been in the service of the U. S. Bureau of Animal Industry in West Virginia, has purchased the practice of the late Dr. C. C. Winegardner, at Goshen, Ind.

DR. E. MILTON DICKINSON (O. S. U. '27) is engaged in poultry disease investigations in southern California, as a member of the staff of the University of California Agricultural Experiment Station at Berkeley.

DR. EDWARD G. BUSSIS (Gr. Rap. '08), for the past six years village marshal and fire chief of Coopersville, Mich., recently resigned these positions to accept an appointment with the Michigan Department of Agriculture.

DR. J. T. BROWN (K. C. V. C. '15), of Belleville, Ill., has resigned as County Veterinarian, effective November 1, and will go to Hampton, Iowa, to take over the practice of his late brother-in-law, Dr. E. C. Scantlebury.

DR. CHARLES S. GIBBS (Mich. '30), who has been connected with Massachusetts State College, at Amherst, for a number of years, has resigned to accept a position with the Lederle Laboratories, at Pearl River, N. Y.

DR. PAUL BERNARD (O. S. U. '29), of Sabina, Ohio, received minor injuries when his automobile skidded off Route 62, near Hillsboro, and turned over in a ditch, early in October. Mrs. Bernard also was slightly injured.

DR. JAMES FLEMING (Ont. '90) retired from service in the U. S. Bureau of Animal Industry on September 30. He had been in the service for 38 years and his last assignment was the Bureau's Quarantine Station at Clifton, N. J.

DR. C. H. ELLIOTT (Chi. '18) has resigned as Kendall County (Ill.) Veterinarian, effective October 1, after serving in this capacity for more than ten years. He has entered the service of the U. S. Bureau of Animal Industry.

DR. EARL M. SIMONSON (O. S. U. '35), of Hooper, Neb., has resigned from the U. S. Bureau of Animal Industry and is now connected with the Medical Research Division of the Chemical Warfare School, Edgewood Arsenal, Edgewood, Md.

DR. CHARLES H. CANFIELD (O. S. U. '97) retired, June 30, from the service of the U. S. Bureau of Animal Industry, at Detroit, Mich., after 38 years of service. He will make his home in Port Huron, Mich., where he was stationed for a time.

DR. DANIEL DECAMP (K. S. C. '29) has resigned his position as poultry inspector in the Bureau of Agricultural Economics and has accepted an appointment in the Bureau of Animal Industry. He has been assigned to field work in Missouri.

DR. HUGH S. CAMERON (Corn. '31) who has been an instructor in research, New York State Veterinary College, Cornell University, has accepted a position with the University of California. He will take up the work of the late Dr. John A. Howarth.

DR. HARRY W. JOHNSON (Iowa '33) has resigned as assistant pathologist, Department of Animal Pathology and Hygiene, University of Illinois, to accept a position as assistant professor of surgery, Veterinary Division, Colorado State College, Fort Collins.

DR. WALTER W. THOMPSON (Mich. '29) is on leave of absence from the Michigan State College for the college year 1936-37. He is filling the vacancy in the Department of Veterinary Pathology, Kansas State College, caused by the absence of Dr. J. P. Scott (O. S. U. '14).

DR. HENRY JARRETT (U. P. '03), of Philadelphia, Pa., judged 50 breeds, including a majority of the hounds, some of the sporting dogs, and all of the working dogs except the Doberman pinschers, at the Fort Pitt Kennel Club's bench show, held at Pittsburgh, Pa., October 15-16.

DR. ERNEST L. HENKEL (Wash. '36), recently called to active duty in the Veterinary Reserve Corps, was located in Puyallup, Wash., during the summer, looking after the practice and meat inspection work of Dr. J. C. Mitten (T. H. '16), while the latter was on duty at Long Acres Race Track as official veterinarian.

DR. J. M. MILLER (McK. '13) of Benton Harbor, Mich., has announced his candidacy for the office of sheriff for Berrien County on the Democratic ticket, opposing Charles Miller, Republican, the incumbent. Dr. Miller ran against Sheriff Miller four years ago and the vote was so close that a recount was necessary, Sheriff Miller winning by a small margin.